INSIDE THIS ISSUE

COOP'S SATELLITE DIGEST

MAY 1980

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COOP'S COMMENT ON TECHNOLOGY

GEAR IS MOVING

I am delighted to report that equipment is now starting to move in some volume from our young industry's overloaded suppliers into dealer and distributor hands. I would have liked to do a company by company run down for you here so that we don't play any favorites or miss someone important but the closeness to the publication deadline of this issue will not allow that. So my apologies in advance for not catching everyone.

H & R (STARVIEW) has been able to ship nearly 100 systems since Miami and is averaging 2-3 new antennas shipped per day. In that have been around 15 of their trailer-mounted demo rigs which allows a dealer/distributor to pull up to a prospect's location and be delivering pictures in typically under 30 minutes time.

STAR (Satellite Television Systems) is also shipping in quantity their 13 foot terminal and they have about the same number (14 or so at this writing) of their trailer mounted rigs on the road.

PARAFRAME had recently completed plans to have their antenna's fabricated in a second plant (in West Virginia) and Jim Vines has created a second source for his laminated ribs in western Canada. After fighting the Chicago high-priced labor and job-shop market for more than a year, Vines has finally worked out some impressive back-up arrangements that will allow Paraframe to greatly increase production quantities and lower pricing.

A number of terminals installed during late March and April went to some very interesting buyers. Filling an order from SPTS Miami, STARVIEW put a terminal into the Dominican Republic; and then followed that up with three more to the same island. STAR/Satellite Television Systems saw to it that terminals were installed for Tammy Wynette and the offices for the Bee Gees.

LNAs are **not hard to find** although at least for now the suppliers seemed to have learned their price-war lesson of last summer. The LNA supplier went into last summer afraid the bottom was dropping out of their market so a price war ensued. It wasn't too long before the quasi-distributors in the cable/professional field were screaming because manufacturers were cutting single unit prices below what they had paid weeks before. The price war stopped as suddenly as it began. Supplies now are higher than at anytime before, off-the-shelf delivery is available everywhere, but the prices are staying up in the $1,000 range (120° K, 50 dB gain). Strange, but true.

Receivers - here's where the bottle neck is. H & R has moved around 100 of the ICM's since Miami. AVCOM is running at capacity and Andy Hatfield is carefully studying enlarged quarters to expand production again. The Ramsey-built Washburn's are starting to trickle off the line but the wait is very long. As reported elsewhere in this issue, Taylor Howard has reached agreement on producing his receiver in quantity (5,000 up per annum) but it will be San-Jose-time, I believe, before we start seeing quantity production. Robert Coleman has lots of people pressuring him to produce. He's undecided but notes his single conversion design might be ideal for a group that was interested in only (say) transponders 2 and 8; the two most popular religious transponders. For right now however receiver deliveries (or lack thereof) continue to keep a lid on growth.

After talking with the suppliers named and a few more I think I have a handle on how many 'private terminal packages' got out the door during the four week period from mid-March to mid-April. Ready for this? Around 120. Not bad for the first real first-month-subsequent to SPTS '80 Miami.

Now, can that number be doubled? **YES** - if you carefully state **when** it can double. By San Jose, I think we could see a mini-industry here turning out 250 brand new antennas and receivers each month, strictly for private terminal use. And again, LNAs don't look to be a delivery problem; only a pricing problem.

Is that the bottom line? Hardly - as this issue reports new products and yet lower prices are coming on fast and San Jose will see them prominently displayed. To those who have worked so hard to get gear moving; congratulations. To those who are going to help us double it by San Jose, keep on burning that midnight oil!

OUR COVER - MAY 1980 CSD

The father of electronic television - Dr. Vladimir Zworykin - was an unscheduled visitor to Miami's SPTS '80. He talked briefly to the assembled throng, toured the exhibits and mused that when he first took his operational television project to RCA's General Sarnoff he never envisioned it would go so far in his lifetime. He recalls one set of executives viewing his all electronic system and then telling him "That's all very nice, but what good is it? What can it ever be used for?".

CSD TECHNOLOGY

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PRACTICAL CIRCUIT TO RECOVER MOLNIYA AUDIO/VIDEO

In the last installment of this look at recovering high quality video and audio from the Russian Molniya/Orbita series inclined orbit satellites we looked at the problems created by the Russian SECAM color system, their 50 Hz operation for sync reference and the unusual PWM audio system. In this installment we will zero in on the recovery of the PWM audio and the re-establishment of locally generated sync to make up for the 'damage' created by the PWM pulses transmitted with the normal sync signals.

The before and after of the sync portion of the transmitted video/audio is shown here. Also included is a detailed schematic of a system created by Birkill to handle this problem.

THEORY OF OPERATION

The input video us terminated and emitter followed. It then splits to feed the sync separator (top line) which applies positive-going separated mixed syncs to the 50 microsecond monostable. The trailing edge of the 50 microsecond pulse is used as a trigger for two additional monostables. The first is of a design range of 8 to 20 microseconds and it times the 3.5 microsecond pulse used to gate the audio pulse out of the video waveform. The control for this variable period (a 5K pot) should be installed on a front panel. Consider it as sweeping (in time) the gating pulse across the blanking interval that contains the audio pulses. It should therefore be set (adjusted) to select the pulse required for decoding. Remember that there are two pulses but that often only one is modulated; the adjustment is simply for clear (distortion free) audio. Once set it should hold unless the timings of the Russian waveform change appreciably. An example of when this might happen suddenly is as they air an old type 0249 monoscope test pattern (card). Other than changes in the Russian timing at the uplink site, the system should be very stable for on-going copy of the Russian audio.

The second monostable directly triggered from the 50 microsecond pulse is a preset variable period around 8 microseconds. Its function is to determine the starting point of the regenerated line (horizontal) blanking period. The preset control should be set such that the regenerated blanking sits exactly over the original 12 microsecond blanking period without erasing any of the picture on either side. On a displayed picture the effect is to shift the picture left or right on the screen, revealing a black vertical bar if incorrectly set (i.e. you see the edge of the original blanking). The trailing edge of this variable 8 microsecond pulse then triggers (1) a 12 microsecond monostable to generate a new blanking, and, (2) a pair of monostables to generate a new front porch and line sync pulse. These timings are shown as being set by fixed components and they should be close enough for the application here without variation.

Prepared from data supplied by:
Steve J. Birkill
128 Cross House Road
Grenoside, Sheffield
S30 3RX, England

Meanwhile the video from the emitter follower has its sync pulses DC restored to +0.7 V and that is passed through a further emitter-follower. This splits to feed a 710 comparator and to have new line syncs and blanking imposed. The mid-amplitude of the audio pulses is at about +0.6 V at the non-inverting input of the comparator. The potentiometer on the inverting input should be set at approximately this value though it may be subsequently adjusted for best audio signal-to-noise ratio. (To minimize the number of user adjustments the pot could be replaced by a pair of fixed resistors. From the inverting input, 2.4K to the +5 V line and a 3.6K to the minus 6 V line should do the trick. Pin numberings on this IC are for the DIL package version.) The comparator's output consists of mid-slice video with audio pulses positive-going at TTL logic levels.

The waveform is gated with the 3.5 microsecond pulse in a 7401 open-collector NAND-gate. The resulting output is a negative-going pulse recurring at the line frequency of 15,625 Hz and width-modulated at the audio frequency. The mean level of the waveform varies with the audio modulation so all that is required to remove the 15.625 kHz component is a CR network. The resultant audio is fed out via an emitter follower. On all Russian audio circuits the maximum modulation frequency is 7.5 kHz.

The DC restored video signal with syncs at 0 V and the blanking level at 0.3 V has new line blanking applied by a second open-collector NAND gate. This is driven by the 12 microsecond pulse. This operation removes the audio pulses and the original line syncs. The portion of the frame sync waveform outside the line blanking period is unaffected. A parallel-tuned circuit, resonant at the mean value of the SECAM color subcarrier frequency (4.33 MHz) prevents removal of color synchronizing information in the reblanking process. The 15K resistor restores blanking level to its correct value of 0.3 volts. A pedestal is not normally applied in the 625-line system; black level and blanking level being the same. The value of this resistor can be changed if output pedestal or sync amplitude are incorrect.

A further open-collector gate applies the re-timed line sync pulses and the re-constituted video waveform feeds an output emitter follower, at 75 ohms.

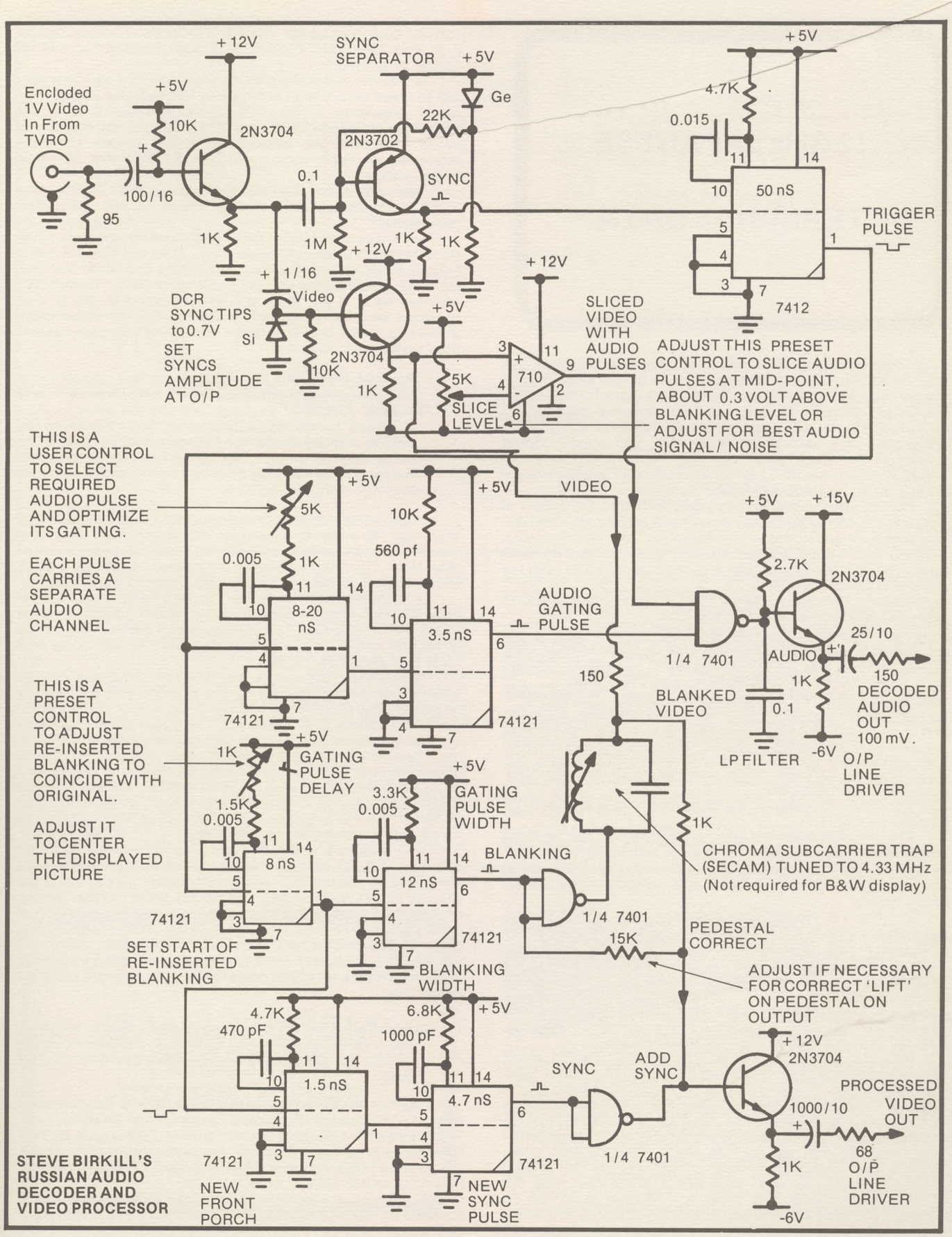
NON STANDARD

In addressing this 'problem' with this solution one ends up with a high quality (although non standard) output waveform in the frame sync region. To correct this to standards which would be suitable for broadcast specifications would require considerable additional circuitry and it is unlikely that anyone making this adaptation intends to plug directly into an NTSC video line feeding a television broadcast transmitter anyhow! On a normal picture monitor or for local redistribution via a typical cable modulator the difference should not be noticeable.

SUMMARY

Again we note that the direct appeal of this system to most **CSD** readers will not be for you to promptly run out and build this 'decoder' gadget. However by making this material available to you we hope that you begin to grasp some of the significant video parameters in use in the world, and also recognize that with a little creative engineering the TVRO terminal of today can be equipped to recover satisfactory audio and video even from complex non-standard sources.

The next time somebody tells you that reception from non-NTSC standard birds is simply not possible with North American receiving equipment, recall this treatment for conversion of the Russian system to NTSC display; adaptions for PAL and other standards in use around the world are by comparison 'a piece of cake' when compared to the differences presented to us by the Russian SECAM and PWM system. In future reports we will look at how these lesser-grade differences can be accomodated with an NTSC receiving terminal.


+12V
SYNC SEPARATOR
+5V
Ge
Encloded 1V Video In From TVRO
+5V
10K
2N3704
22K
2N3702
SYNC
0.1
100/16
95
1K
1M
+12V
1K
1K
+12V
+5V
+ 1/16
Video
DCR SYNC TIPS to 0.7V
Si
SET SYNCS AMPLITUDE AT O/P
2N3704
10K
1K
5K
710
SLICE LEVEL
SLICED VIDEO WITH AUDIO PULSES
ADJUST THIS PRESET CONTROL TO SLICE AUDIO PULSES AT MID-POINT, ABOUT 0.3 VOLT ABOVE BLANKING LEVEL OR ADJUST FOR BEST AUDIO SIGNAL/ NOISE
+5V
4.7K
0.015
50 nS
TRIGGER PULSE
7412
THIS IS A USER CONTROL TO SELECT REQUIRED AUDIO PULSE AND OPTIMIZE ITS GATING.
EACH PULSE CARRIES A SEPARATE AUDIO CHANNEL
5K
+5V
10K
+5V
VIDEO
0.005
1K
560 pf
8-20 nS
3.5 nS
74121
74121
AUDIO GATING PULSE
+5V
+15V
2.7K
2N3704
1/4 7401
25/10
AUDIO
150
1K
0.1
150 DECODED AUDIO OUT 100 mV.
LP FILTER
-6V
O/P LINE DRIVER
BLANKED VIDEO
THIS IS A PRESET CONTROL TO ADJUST RE-INSERTED BLANKING TO COINCIDE WITH ORIGINAL.
ADJUST IT TO CENTER THE DISPLAYED PICTURE
1K
GATING PULSE DELAY
+5V
1.5K
0.005
8 nS
74121
SET START OF RE-INSERTED BLANKING
3.3K
0.005
GATING PULSE WIDTH
12 nS
74121
BLANKING WIDTH
BLANKING
1/4 7401
1K
CHROMA SUBCARRIER TRAP (SECAM) TUNED TO 4.33 MHz (Not required for B&W display)
PEDESTAL CORRECT
15K
ADJUST IF NECESSARY FOR CORRECT 'LIFT' ON PEDESTAL ON OUTPUT
4.7K
470 pF
1.5 nS
74121
NEW FRONT PORCH
6.8K
1000 pF
4.7 nS
74121
NEW SYNC PULSE
+5V
SYNC
1/4 7401
ADD SYNC
+12V
2N3704
PROCESSED VIDEO OUT
1000/10
68
1K
-6V
O/P LINE DRIVER
STEVE BIRKILL'S RUSSIAN AUDIO DECODER AND VIDEO PROCESSOR

12 GHz JAPANESE TERMINAL DATA

Those attending the Miami SPTS '80 earlier this year (see **CSD** for March 1980) had the opportunity to visit with Vitalink Corporation's James Janky concerning his plans to import into the United States a 12 GHz receiving terminal package for distribution in the U.S. and Canada. At that time VITALINK's plans were in a very evolutionary state and pricing kicked around at the Miami show centered in the $1200 to $1500 region per terminal for 12 GHz. At least one Canadian buyer purchased six packages on the spot.

During April VITALINK was able to firm up the details of the package and to put down some hard pricing information. The packages are intended for reception from the Canadian ANIK-B bird (see **CSD** for March); a dual band satellite currently operational with television programming on both the 4 and 11/12 GHz downlinks.

Janky's firm calls the 12 GHz terminals **GIGAPIX-12** systems and they consist of the following:

1) An outdoor unit designed to receive the 12 GHz FM video/audio and downconvert it to a 900 to 1200 MHz "high IF" for transportation (as an FM signal) through a piece of 75 ohm coaxial cable to an indoor unit.
2) The indoor unit contains a second mixer that downconverts into the mid VHF range where the signal is further (IF) amplified and then detected in a discriminator circuit. This detected video and (sub-carrier) audio is then applied to a VHF TV channel remodulator which produces a 'standard' NTSC signal on one of the lower VHF television channels.

The VHF remodulated signal is looped to a standard TV receiver for display.

The package does not include an antenna nor antenna mount, nor the coaxial cable required to inter-connect the SHF outdoor unit to the indoor UHF/VHF unit. We'll talk about antenna options shortly. A block presentation of the system appears here.

The input to the SHF downconverter is a WR-75 flange; the standard flange for this frequency range. Powering to the SHF unit at the antenna is through the coaxial cable (i.e. powering is duplexed); a -12 VDC level. The appearance of the outdoor package is similar to the die-cast aluminum housing one sees hanging on cable TV lines all across North America.

The indoor unit is a table top design with five push buttons for selection of any of five channels of SHF video from the bird. It operates from standard 110 VAC power mains.

Now the pricing scramble. The pricing floating about Miami and subsequently reported in the March issue of **CSD** was not correct. Actually it was correct at the time, but a massive misunderstanding between the Japanese suppliers and Vitalink was the fault; the Japanese chaps were quoting pricing based upon the delivery of "very substantial quantities" of the packages to North America and when Vitalink went back for a smaller initial quantity the pricing jumped upwards. So what does this package cost, less the antenna, transmission line (most any 75 ohm cable will do although you have to be careful of what 75 ohm line you select as a function of line length from downconverter to inside unit) and the antenna mount? **Vitalink** (701 Welch Road, Suite 225, Palo Alto, CA 94304; 415-328-4972) says you can buy one for $3,000 (U.S. funds).

Is that the end of the pricing discounts? No, but everyone has to crawl before they can walk in this exercise and pricing varies according to quantity. Janky advises that if one distributor orders say 100 units, the pricing to the distributor drops to $2,000 per terminal package. Anyone seriously interested in a really large quantity, say 1,000 units, will need to talk with Janky.

Now what about the balance of the system? That is, how much more money will a chap spend to get the sytem operational?

Let's take the antenna first. 12 GHz antennas have never (to date) been produced in quantity. They are close to being 'job-shop' items with the major suppliers and there are both job-shop pricing and job-shop delivery delay frustrations involved here. If you think you want to get into the 12 GHz business, be prepared for both problems. **CSD** surveyed a pair of the two better known antenna houses for this package and here's what we found.

1) **Prodelin** (P. O. Box 131, Highstown, N.J. 08520) has a pair of applicable antenna product lines available. One is their 'Satellite' antenna line and the other is their standard 'Terrestrial' antenna line. As nearly as we can tell the primary difference between the two lines is the name they call it by; in fact spec for spec in some areas the terrestrial line may even be a better choice (gain for example is **slightly** higher).

In fact when Coop first installed a test 10 foot terminal two years ago the antenna chosen for that experiment was a ten foot Prodelin **terrestrial** antenna with their standard button hook feed. The mount was also a standard **terrestrial** mount, which as we shall see now can save you substantial dollars.

In the **satellite** antenna line Prodelin has a 6 foot (model 203-750) which has 44.6 dB of gain, WR-75 flange (to mate directly with the GIGAPIX 12 flange) and a $895 list price. The **terrestrial** antenna applicable is their 203-740 and it has 44.8 dB of gain and lists for $590.

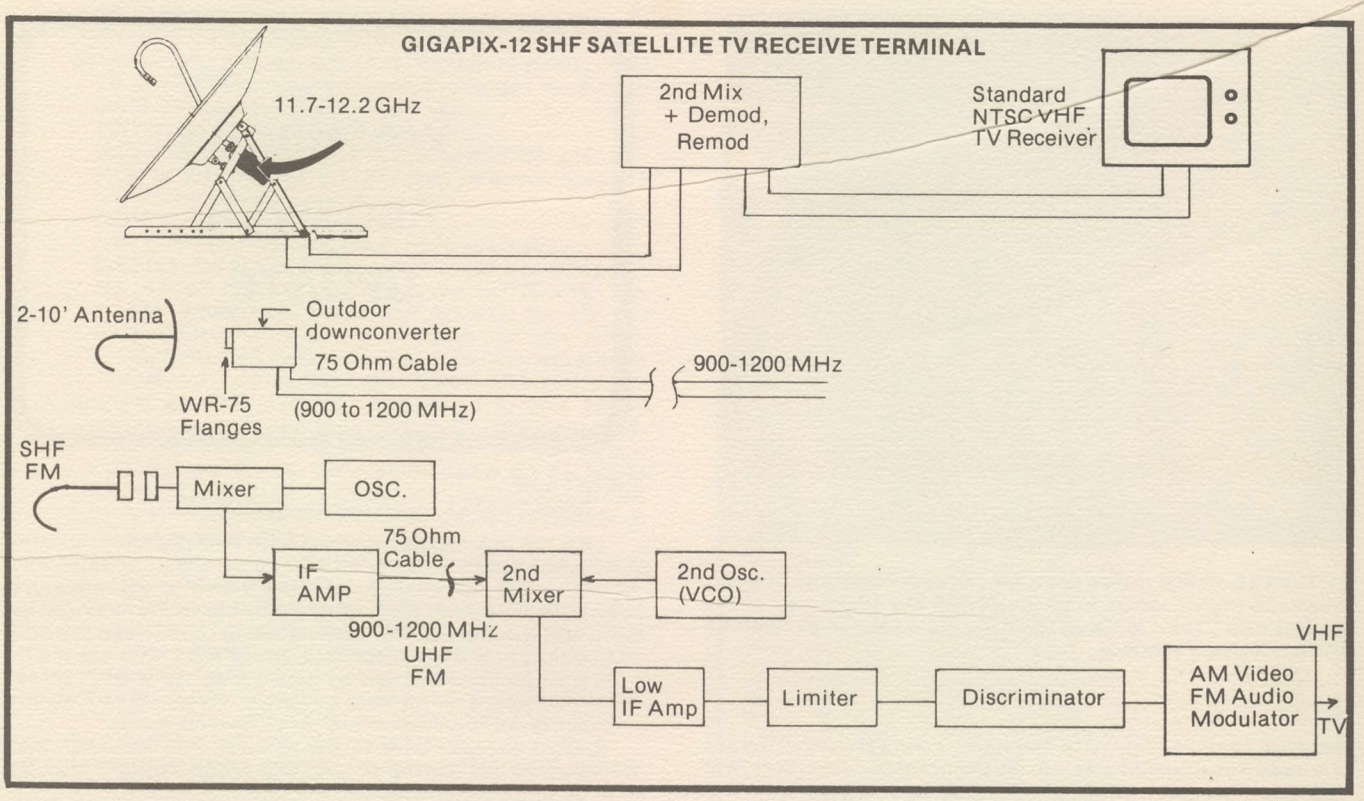
A manually adjustable az/el mount available in the satellite line (model 120-140) lists for $1385. However, over the terrestrial line there is something called a 'tilt mount' which bolts onto a piece of 4.5 inch (OD) pipe that allows the same manual adjustment of azimuth (360 degrees around the pipe) and elevation (from -5 degrees to +50 degrees with a 10 degree vernier 'fine' adjust). The model number is 45-140 for a (4 or) 6 foot antenna and the list price is $285. Prodelin also has 2' (201-740 at $375), 4' (202-740 at $485), 8' (204-740 at $850) and a 10' (205-740 at $1400) in their terrestrial line. A tilt mount for the 8 or 10 foot is their 46-140 ($595).

This suggests a six foot antenna (terrestrial 203-740) offering 44.8 dB of gain plus a 45-140 tilt mount can be combined for around $875 and a really clever person could get the tilt mount built locally for around $100, further saving another $175 or so. And that says that the antenna (if a six foot is the right size for your location) can be a $700 package on top of the $3,000 onesy-quantity GIGAPIX-12 receiver. The coax? RG-59 if the run is very short (say 25-35 feet); RG-11 for up to perhaps 75 feet and .412 or larger aluminum jacketed cable for longer runs.

2) **Andrew** (10500 W. 153rd Street, Orland Park, IL 60462) has a series of terrestrial antennas available covering 12.2 to 12.7 GHz. They will work just fine down to 11.7 GHz.

Like the Prodelin antennas we have WR-75 flanging here ready to bolt against the mating flange on the GIGAPIX unit. The Andrew P6-122C is a six footer with 44.7 dB of gain (at 12.2 GHz) and a price tag of $590 list. Also available is a four footer (P4-122C at $480), an eight footer (P8-122C at $980) and a ten foot version (P10-122C at $1580).

There are two mounts available; their VT6 is similar to the Prodelin tilt mount and sells for $140 and the VT10 is the larger version for the 8 and 10 foot models for $260. Also, there is a



ground (or roof) mounting tilt mount; the HT6 for 4 and 6 footers at $240 and the HT10 for 8 and 10 footers at $460.

So for the 6 foot Andrew (P6-122C) and the VT6 tilt mount you will have around $730 invested (list pricing). Note however that all antenna pricing in this field is 'FOB point of origin' and that in many cases the shipping charges and crating charges may add up to almost as much as the antenna. Check first if you are concerning about charges; they are not cheap. (One Canadian who bought a ten foot dish in the states told us during the Miami SPTS that the freight bill to Ontario came to something like $1700 !).

ANIK B Coverage

The only bird in the sky for North America viewers with regular 12 GHz (video) signals on it at the moment is ANIK B. Coverage from ANIK B is supposed to be in a set of beams centered into northern Ontario and northern British Columbia. If one **believes** the footprint data, coverage into the U.S. will **not** extend much below the border area. Jim Janky of Vitalink suggests a sparklie-free picture in the Chicago area, for example, will require a ten foot dish.

The present ANIK B signals are but 6 dB hotter than U.S. domestic 4 GHz signals and the 'rumor' that you can tap into the 12 GHz circuits with 18 inch dishes is far into the future when the 100 to 200 watt-per-transponder satellites go into operation. For now, getting 20 watts of TWT power per channel is pushing the state of the art.

This final thought. The same ANIK B's 4 GHz signals are available at reasonably good levels (sparklie free on 13 foot dishes with 120 degree LNAs) far south into Florida. The ANIK B operators deny this is possible but those of us who saw the pictures during SPTS '80/Miami know differently! It is possible [**but only conjecture**] that if the 4 GHz signals from ANIK B are extra-hot that far south that the 12 GHz signals may also extend (at useable levels) further south than the published data suggests. There is only one way to find out...and that's to go looking for it!

SMALL SYSTEM RECEIVER TECHNOLOGY

A COMMERCIAL HOWARD RECEIVER

The popular Taylor Howard receiver, seen in its latest form at the Miami SPTS '80, now appears headed for commercial production with first units due to be off the production line around the middle to end of June (just ahead of SPTS '80 in California).

Following up from Miami's SPTS, Howard has reached agreement with two separate groups to produce the receiver under his guidance. One version of the receiver will be produced partially in California and partially in Australia for a firm that will distribute them in Australia. This particular version, designed for INTELSAT reception, will have a front panel two-position switch for either channel 'A' or 'B'. This switch in turn is 'programmed' with chassis mounted (dip) switches which allow the system installer to align any two (1/2 transponder) format channels with the 'A' and 'B' position switch. For those who would ask **"What do this..."** the answer is simply that the Australian marketplace, government regulated to some extent when it gets off the ground this fall,

LET'S SEE- 5,000 radios per year...Fraser Hickox of Sydney, Australia [right] seems to be pondering the magnitude of his project with Taylor Howard [left] during a session at Miami's SPTS this past February.

wants to be sure that 'rural satellite TV viewers' do not have the **ready**-accessibility to **all** of the transponders that will ultimately become available to them; some of course not being 'broadcast' television. With this announcement that a Howard INTELSAT receiver is going into production for Australia and the Pacific comes another report that some tests through INTELSAT of a 1/2 transponder spotbeam television service, boresighted on Australia, will begin as early as this coming September. These tests are to be conducted by the Australian government and via these tests 'outback' Australians will gain access to their first realtime television. The **tests** are expected to last until the Australians have their own (12 GHz) bird in operation in the mid '80's.

On the domestic front Howard has reached agreement with a western Canadian group calling themselves **Satellite Supplies** (604-859-6359) to manufacture a $1300 price range (quantity one) receiver with the following features:

1)Twenty four channel tuneable
2)Dual audio subcarriers
3)RF output in the UHF TV range (i.e. remodulated)
4)Keyboard input (i.e. you punch up the desired transponder with a keyboard that drives a small microprocessor)

This version of the Howard receiver will also have as options a remote control system that allows the transponders to be selected from the 'easy chair'.

Howard reports that he has been able to design 'around' the two primary long lead time items which other manufacturers have been experiencing some difficulty in obtaining. The double balanced mixer (many radios use the Vari-L DBM500) has been replaced with a mixer of Howard's design while the especially difficult-to-obtain VTO (such as the Avantek 8350) has been completely replaced with a frequency snythesizer which Howard has developed. **"This is a major breakthrough for us"** notes Tay **"simply because we will not be dependent upon an outside supplier who is perhaps incapable of supplying us with the parts we need to produce large quantities of these radios"**. The large quantities Howard alludes to here are in the 5,000 radios per year range upwards. The North American producer, Satellite Supplies, has been reported quoting prices of $894 per radio in 1,000 quantity lots in case you are interested in getting into this business in a big way!

YES - you can expect to see both of these versions at SPTS '80 in San Jose over the July 4-6th weekend.

WASHBURN RECEIVER UPDATE

ERRATA #4

Reference PLL demod assembly A2A1A1...

1)**L5** has been **added** in series with R20 (150 ohm) to suppress noise remodulation effects that unnecessarily raised the SNR threshold. This is an 0.82 uH miniature choke (Delevan 1025-18) and may be readily mounted by lifting one end of R20 and installing L5 between the now empty hole and the elevated end of R20. This was the final update to the demod before a series of SNR threshold tests that indicate a receiver threshold of **7 dB** for all deviations encountered in video modulation.

2)More experience with the receiver has indicated that step #7 (appearing on page 22 of the manual) may be simplified as follows:
With the 70 MHz generator still connected, plug P1 into A2A1 J1 and adjust A2A1A1 R9 (on demod assembly) for a centered reading on the center tune meter with the **AFC off**. (Check mechanical zero adjustment of the meter with power off prior to performing this step.)
The front panel signal strength meter can be used to obtain an accurate measurement of the true CNR delivered to the receiver by your antenna and LNA with the following procedure.
"Broadband noise will..." (continue with text).

Reference Assembly A2A1...
The following errors on the assembly drawing (figure 18, page 27) have been noted:

1)**R65 is not shown**, it should be directly above R64.
2)**Designator CR11** was utilized twice; the diode just **below** S5 should be changed to **CR14** (Change schematic also and add to parts list by changing entry to CR3,11,**14** - total quantity **3**). Delete the duplicate entry of CR12,13 two lines below this.
3)**The band**(ing) on many of the diodes was left off the final manual art and should be applied as follows:
a)**CR1** - band on **right**
b)**CR2** - band on **left**
c)**CR3** band on **left**
d) **CR4 and 5** - band on **left**
e)**CR9** - not shown, **draw** in between R67 and R35 with band at **top**
f)**CR10** - not shown, **draw in** above CR4 with band at **right**
g)**CR11** - band at **bottom**
h)**CR12** - band at **left**
i)**CR13** - band at **top**
j)**VR1** - not shown, **draw in** above R32 with band at **right**
4)U4, just below R33, is **incrorectly labeled** Q4.
5)**R18** is incorrectly shown on the parts list as 1/4W; it should be **1/2W**.
6)The diode symbol at DS1 is reversed and should show show the cathode end to the **left**.
7)U4 is incorrectly shown on the parts list at TL431CP; it should be TL431**CLP**.
8)The following component value changes have been made:

a)**R34** has been changed to **300 ohm** (same type) to equalize the brightness of the green and amber LEDs.
b)To rpevent pick-up and amplification of strong local TV and FM signals the following changes have been made to video amplifiers U1 and U2:
1)**R2** is now **24** ohms (same type)
2)**C2** is now **390** pF dipped mica, CM05FD391J03
3)**C2** is now **5.0 or 5.1** pF disc ceramic, Sprague 10TC-V50
4)**R10** now **30** ohms, same type
5)**C7** now **390** pF dipped mica, same as C1 above
6)**C8** now **5.0 or 5.1** pF disc ceramic, same as C2 above
7)A 1.8 pF disc ceramic (Sprague 10TCC-V18) has been **added** from source to drain of Q1 (or, U2-1 to ground) to equalize the inverting and non-inverting frequency response of U2. The new capacitor is **C38** and it is mounted **below** the circuit board.
8)Video amplifier U2 has been found to give better linearity at high frequencies with additional loading at its output. Thus, **R73** (680 ohm, 1/4W carbon comp or film) has been **added below the PC board** from U2-8 to U2-3 (-8V supply). Sufficient current is still available for the peak current demands of clamp diode CR1.
9)The +8V connection from U1 to U2 has been found to have resonances that may cause frequency response variations at the high end of the video range. The 'cure' is breaking the +8V trace that goes **below** C2 and R7 and **installing** a ferrite bead **below** the PC board (same type ferrite as others).
10)A trace jumpering U10-7 to U10-7 was omitted on the PC boards and **should be added** with a short wire, as this is the +8V supply to U10-6.
11)Delete E15 from both the Processor (figure 16) and the Demod Console/Remote schematics (figure 19) as all front panel ground points may be readily wired together and returned via Processor E4.

Processor Assembly A2A1/Downconverter A1A1

It has been found that some VTOs will not track to the dial scale shown on page 26 of the Washburn Manual and thus will not allow proper set-up of the remote control box due to high mixer VSWR under full (over 20 milliwatt) drive conditions. The cure is to **pad the VTO output** to the recommended mixer input level (5 mW) with the pad giving the extra insurance of the low VSWR to the VTO. Some change in the tuning scale is necessary; however, repeatability from unit to unit is now excellent. The specific changes are as follows:

Down Converter A1A1:

1)**Cut** a 0.156'' gap in the middle of the trace from U3-4 to J1 center pin. Solder a 39 ohm **1/8th watt** carbon comp resistor (R12) across the gap.
2)**Add** a 150 ohm **1/8th watt** carbon comp resistor (R13) from U3-4 (output) to U3-3 (ground). Use **very** short leads.
3)**Add** a 150 ohm **1/8th watt** carbon comp resistor (R14) from J1 center pin to any of the four corner ground pins on that connector. Use **very** short leads.

Processor Assembly A2A1:

1)**Delete** C19, CR3, R30, R31 and U5.
2)**Replace** CR2 with a jumper and jumper the holes for U5-1 to U5-0 (upper two holes on assembly drawing figure 18).
3)**Change** R28 to 2.0K, same type
4)**Change** R27 to 330K, same type
5)**Change** R32 to 10K, same type
4)**Cut** the trace from U4-C to the lug on S3 just above the one labeled E7 on figure 18. The middle lug should be labeled as the ''new'' E9 (cross out the 'old' E9).
7)**Connect** a 1.0 UFD tantalum (same type as C22, **new** part is C39) across the leads of a 3.0 K +/-5% carbon comp resistor (1/4 watt); R74. Solder the resistor lead connected to the **negative end** of C39 in the 'old' E9 hole. Connect the other resistor lead to the 'new' E9 on S3.
8)**The resistance chart** on page 26 should now be changed to read as follows:

Transponder	%/Max.Res.	Transponder	%/Max.Res.
1	6.8%	13	37.8%
2	9.0%	14	41.2%
3	11.4%	15	44.6%
4	13.6%	16	48.2%
5	16.0%	17	52.0%
6	18.4%	18	56.0%
7	21.0%	19	60.0%
8	23.4%	20	64.2%
9	26.2%	21	68.6%
10	28.8%	22	73.2%
11	31.8%	23	77.6%
12	34.8%	13	82.4%

9)The references to a -1.25 volts'' on pages 25 and 26 should be changed to a -5.5 V, and the references to U5 and CR2 deleted. Delete the reference to the adjustment on R30 on page 27.

Remote Control A3

1)**Change** R4 and R6 to 680 ohm, same type
2)**Change** R12, 14 aND R20 to 1.0K, same type
3)**Change** R24 to 1.3K, same type
4)**Change** R26 to 120K, same type
5)**Change** R25 to 50K pot, Bournes 3386F-1-503 (et al)

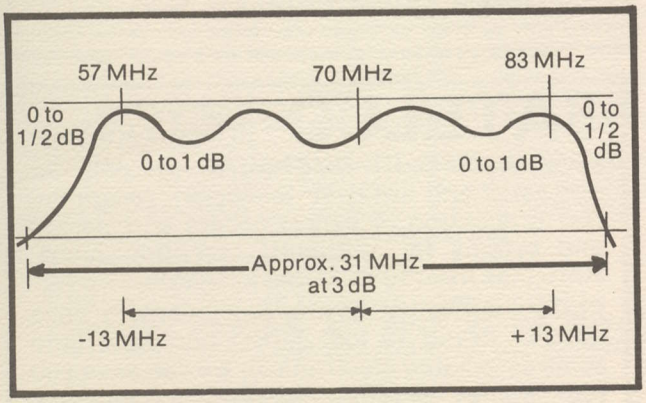
Down Converter A1A1

The 70 MHz IF filter has been revised **to reduce the slope** across the passband making it less susceptible to response changes from imperfect VSWR on the 50 ohm line to the demodulator console when U9 is not used. The specific changes are:

1)**Change** C10 to 27 pF (Sprague 10TCC-Q27)
2)**Change** C11 to 30 pF (Sprague 10TCC-Q30)
3)**Change** C13 to 18 pF (same as C17)
4)**Change** C14 to 56 pF (Sprague 10TCC-Q56)

Further experimentation suggests that the best method of **tuning the 70 MHz IF filter** is as follows (change page 15, steps 1 through 9):

1)**Tune L3** for a **notch** at 47.5 MHz and **L5** for a **notch** at 92.5 MHz
2)**Tune L2,L4,L6** for **a max** at 70 MHz
3)**Tune L3** for a **max** at 57 MHz and L5 for a max at 83 MHz
4)**Repeat** steps 2 and 3
5)**Repeat** step 2, **then tune L4** small amounts in either direction while retuning L6 to establish a passband shape with two outer and two inner peaks. The primary effect of L2 is to change the size and centering of the inner peaks.
6)**Repeat step 5** until a passband as shown here is obtained. The objective is to obtain the flattest possible response over the region occupied by the peak-to-peak carrier deviation (+/-13 MHz).



Ramsey Electronics advises that W-J is now supplying U6 (**890** MHz VTO; correct schematic figure 7) to them as a special order item; part number V705R. No component changes are required. Large quantities of the Hewlett Packard mixer (U5) continue to be available at this writing so the PC board changes per 'Errata #1' (see inside back cover of manual) utilizing the Mini-Circuits TFM-2 are necessary only if you choose to use that mixer.

Recent Amphenol connectors (part number 32650) used for J5 and marked 74868 UG-1095A/U require a different adapter bushing when used with 0.141 hardline. The parts required are a #6 thru-hole (0.148) x 1/4'' diameter x 3/16'' long solderable spacer (H.H. Smith 8704) and a #6 flat washer 3/8'' or 9/32'' OD (change the parts list). Change steps 1) and 2) on page 14 to read as follows:

1)**Sweat** (solder) the spacer to the hardline leaving 5/16'' hardline projecting beyond the spacer.
2)**Cut through** the outer-jacket (only) of the hardline, flush with the front of the spacer (a jeweler's saw or mini-hack-saw is the best tool) and peel or twist off the jacket to expose the Teflon insulation. Cut through the Teflon insulation to the center conductor 0.13 inches from the face of the spacer. Remove the portion cut free and install the center pin butted-up-tight to the center insulation. The flat washer and then the connector nut may now be slid over the hardline from the **opposite end** to complete assembly of the connector.

Sound IF A2A1A2/A3

The winding instructions for L5 have been changed slightly **to center the slug tuning range.** Change the turns count shown on page 37 of the manual as follows:

L5-1....57-1/2 turns
L5-2....55-1/2 turns
L5-3....50-1/2 turns
L5-4....97-1/2 turns
L5-6....85-1/2 turns

Miscellaneous

Some kit builders have apparently been told by various parts distributors that both the Alliance rotor motor and the Plessey SL1613C are no longer available; both statements are incorrect.

Alliance has assured the authorized distributor for the kit, Ramsey Electronics, that although the C225A rotor is no longer a distributor item, the **replacement motor** will **be offered indefinitely** (which only makes good sense since all of their motors differ only in the type of position feedback device used).

The Plessey regional sales office reports that while the 1613 has not been a hot seller (before this receiver!) it is available and shares the same 'die' as their 613 device (metal can) which Plessey intends to keep in the product line indefinitely. Ramsey reports they have not had any availability problems with the 1613.

ONGOING WASHBURN ERRATA

While some of the 'errata-changes' appearing in CSD over the past three months for the February-released Washburn TVRO Receiver Manual are corrections **to the original text and drawings, a high percentage of the data is Clyde's desire to keep potential builders of this receiver** up to date **in later parts availability changes and newer techniques for improving the basic receiver. CSD thanks Washburn for staying 'on top' of the project and seeing to it that through CSD there is a constant flow of new information relating to this innovative receiver.**

The manufacturer (**SAT-TEC** at Box 10101, Rochester, NY 14610; 716-381-7265) describes their receiver as a 'cheapy radio'. In technical talk, that means it is inexpensive. The big news here is not so much how they do it, but what they do. So we'll give you that first.

1)**Wired and tested** - ready to plug in and operate - **$995.00**
2)**A kit**, everything here including case, power supply -

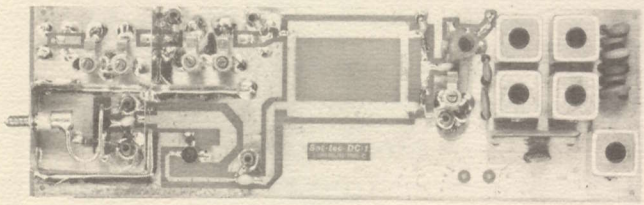
$695.00

3) Wired and tested circuit boards (a pair as we shall see) - $695.00

What is it? A 3.7 to 4.2 GHz satellite video receiver with such features as:

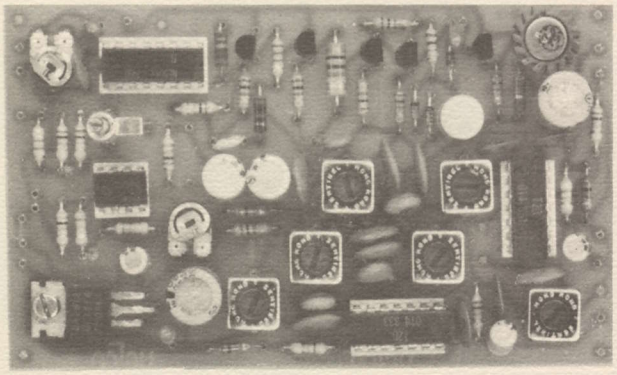
a) Double conversion (the first conversion is from the input 3.7 to 4.2 range down to 1100 MHz; second conversion is to 70 MHz);
b) PLL demodulator (Signetics 564 'selected');
c) Dual sound sub-carrier (6.2 and 6.8 is standard) selection;
d) AFC circuitry (+ /- 5 MHz locking range);
e) Video (1 volt P-to-P) and audio (1 volt) to drive either an external RF modulator (they have model BC-1 RF modulator available as a kit only for $25) or loop through a VTR to use that modulator.

The SAT-TEC 1 receiver is on a pair of circuit boards. On the DC-1 board is the 1100 MHz IF amplifier and filter, 1170 MHz LO (high side injection), first VCO (a quality Watkins-Johnson V802 unit), first mixer (Vari-L DBM 500), second mixer and second LO and a 70 MHz amplifier and filter. Level out of this board, at 70 MHz, is -20 dBm. This board, which gets you from 3.7/4.2 down to 70 MHz, has 60 dB of gain and operates from a single 20 VDC line (at 200 mA). Can you buy this board alone? Yes...contact SAT-TEC for details.



SAT-TEC downconverter board [DC-1] converts 3.7-4.2 GHz down to 70 MHz IF after passing through high IF of 1100 MHz.

The second circuit board is their demodulator board. It takes in the 70 MHz IF signal and produces 1 volt P-T-P video and 1 volt of audio. There are a pair of audio demods in the unit and you can order them (or set them up) on any of the popular audio sub-carrier frequencies (6.2 and 6.8 are of course the most comon). This board has a PLL demod (NE564 'selected' for good performance at 70 MHz), video processor (CCIR de-emphasis, 4 MHz low pass filtering and 30 MHz clamp), and AFC circuitry (the AFC has a lock range of greater than 5 MHz). Powering is via a 20 VDC line at 200 mA.

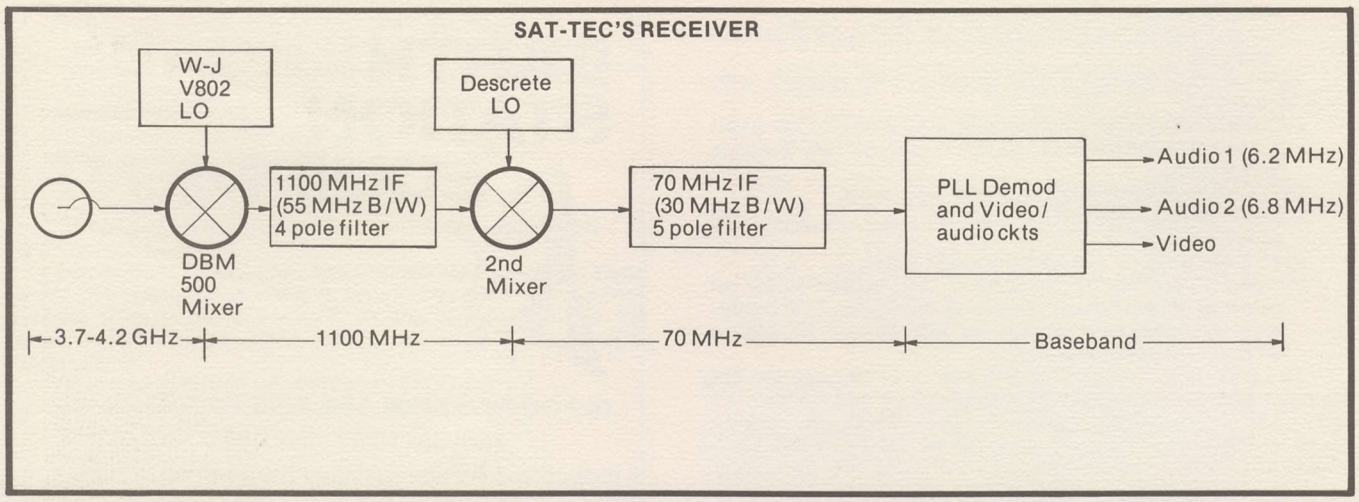


D-1 DEMODULATOR board completes the system transforming 70 MHz IF signal to baseband video and audio [two sub-carriers].

The wired and tested package is in an enclosure with a tuneable calibrated knob (for transponders). Note that you have to have an external modulator of some sort as the output is baseband.

SAT-TEC was present at the Miami SPTS with both their basic kit information and circuit boards and parts. Subsequent to the Miami show they have contracted to supply a large quantity of the boards (wired and tested) to a Canadian firm that will be introducing the system re-packaged for Canadian sale. Delivery at the moment is from O-T-S (off the shelf) to 3 weeks depending upon how you hit their production schedule.

A few words of observation about the receiver offered. The design looks solid and certainly the selection of the Watkins-Johnson VCO and the Vari-L DBM-500 high mixer suggest that no corners have been cut in the SHF portion of the radio. The world of demodulators has come a long ways in the past few months and with better demod circuits and some relatively sizeable production runs costs are coming down



rapidly here as well. IF gain (at both 70 and 1100 MHz) in this receiver is with the new but very popular MWA series devices and older but suitable devices such as the Amperex ATF-417 25 dB gain hybrid amplifier unit.

SAT-TEC is taking advante of large quantity parts buys by employing parts in this receiver which are also being utilized in other affiliated company products. We think there is a message here for anyone thinking about building receive system hardware for low cost (as in private) TVRO use. With the impact of such buying procedures the pricing on satellite video reaceivers may be headed down faster and deeper than we anticipated even a few short months ago. For the moment at least, these new kits and W/T units would appear to be the lowest priced systems available to the marketplace.

MORE DATA ON LNA PROGRESS

If you have been worrying about not having the 'proper' test equipment to work with building your own lower-cost LNAs here is a system worked out by Ken Rae which should be very appealing. The purpose of this particular system is to check the alignment of one or more stages of LNA (multiple stages tend to be more difficult to properly align due to coupling mis-matches between stages) so that they are flat across the full 3.7 to 4.2 GHz band. Most of the equipment required will be found in your LNA plus receiver package; the only additional equipment required is:

1) Oscilloscope (wideband units to 100 MHz are nice but not required)
2) Saw tooth generator at 5 CPS (can be the horizontal output from the oscilloscope sweep)
3) a 12 watt, 18'' florescent lamp bulb and associated ballest if required.

See figure one. Rae places the lamp directly in front of the feedhorn attached to the LNA. This can be done with the whole assembly sitting on your test bench. The florescent lamp is (believe it or not!) a very linear noise source at 4 GHz (some incandescent lamps will work just as well). The lamp puts out a linear white noise burst with respect to the 60 cycle AC, well up into the GHz range. The 5 CPS sawtooth couples back into the system through the LO (effectively modulating it). The IF amp (in the 70 MHz range) amplifies the signal from the florescent lamp noise source (along with the LNA) and by tuning the LO through the range you can look at the full 500 MHz spectrum of the LNA. The output of the IF at 70 MHz requires a scope good into this range if you intend to **directly detect** the energy present in the 70 (typically 55 to 85) MHz range.

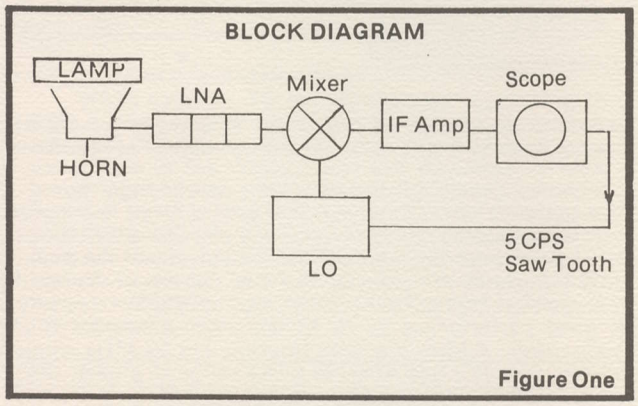


Figure One

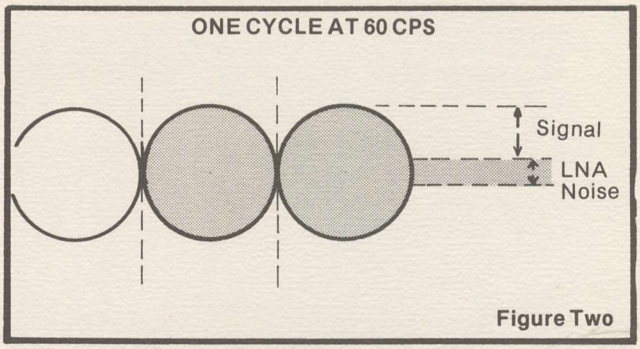


Figure Two

Prepared from material submitted by:
Kenneth D. Rae
737 South Clarkson
Denver, CO 80209

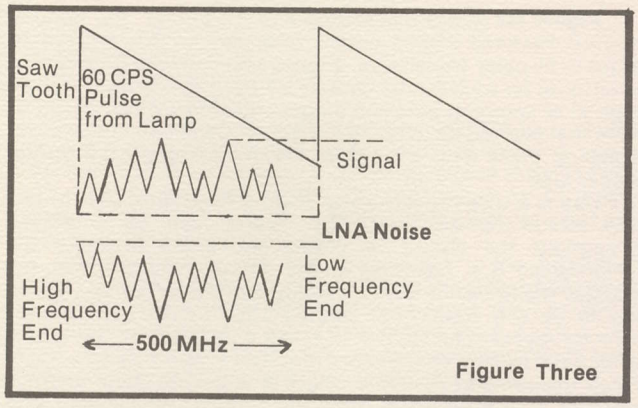


Figure Three

Rae reports this sytem performs very well with IF gain in the 50 dB region and even with single stages of LNA gain (although multiple stages provide more voltage gain and therefore greater display sensitivity or height).

Figure two shows what you will see with each cycle at 60 CPS. The LNA noise is 'buried' by the noise of the florescent lamp white noise broadband source.

Figure three shows a display that indicates the LNA has poor bandwidth. All 'signal' tips should have the **same** amplitude or height on the display.

Figure four shows the same display with the florescent lamp switched off; here you need sufficient system/scope sensitivity to see the noise 'pattern' or 'floor' of the early LNA stage(s).

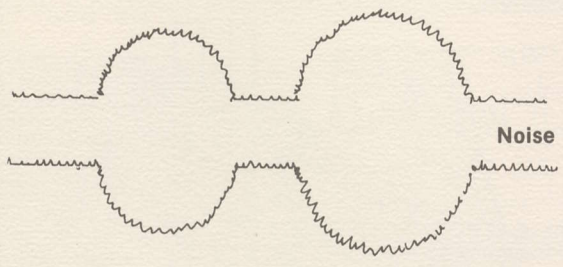
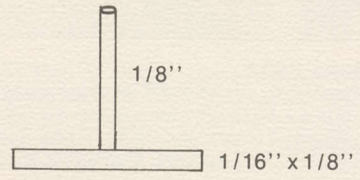


Figure Four



Vary the size of these from 1/16'' square to 1/4'' x 1/8'' (Tuning Wands)

Figure Five

Rae suggests that while most LNA circuit board layouts employ fixed inductances (i.e. printed onto the boards and not adjustable) that individual amplifier stages can often be improved by 'reloading' the 'L' of the circuits with various experimental 'wands'. A wand is made up for test purposes by

cutting various pieces of metal (Rae says he uses flat-rolled tin cans although brass or sheet copper would also work just as well) into various sizes such as from 1/16th inch square up to 1/4 x 1/8 inch in size. Glue the metal portions onto a short plastic rod (a 'swizzle stick' should work just fine!) as shown in **figure five**. The plastic rod is a 'handle' that allows you to carefully move the metal portions around on the circuit for measurements and tests utilizing the signal source system just described. The purpose of the tests is to reload the circuits in such a way that you optimize the response of the system as indicated by the scope display.

EXAMPLES OF TUNING

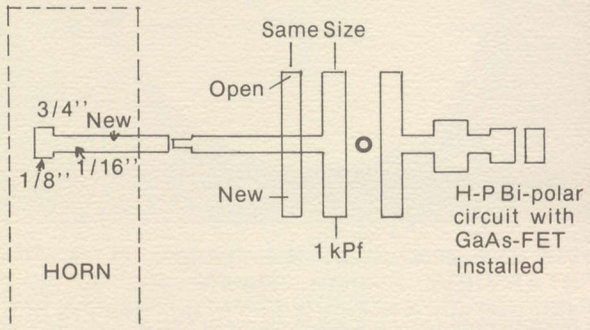


Figure Six

Figure six shows one example of 're-tuning' the popular Hewlett Packard etched circuit intended for the 6101/6102 series of bi-polar transistors. **Figure seven** shows both tuning techniques for an HP 1101 GaAs-FET followed by a 6102 and a method of coupling between stages utilizing a piece of RG-58 cable that has had its outer jacket and braided shield removed, replacing these with a 1-1/4 or 1-1/2 inch length section of copper tube.

Rae is a true experimenter and he has found that in any LNA circuit he has built the 'Wand' can be employed throughout the circuit to check and often improve the performance (i.e. flatness) of the circuit. You can see the changes made by the scope display and these tell you which way to go with your final configuration of the LNA etched inductor layout. The system in effect allows you to 'measure' (after a sort) where changes are required to optimize all sorts of things including a) strip line length or width, b) stage to stage coupling, c) local oscillator coupling, d) horn probe length, and e) even bias on LNAs.

There is one warning. Tuning wands, moved about on the board, can cause the LNA to oscillate with excessive current. Keep a sharp eye on the bias meters while tuning and be prepared to shut down at the first sign of excessive current on your device.

Finally this note from Rae. See **figure eight**. He suggests that if you want to maintain a linear output from an Avantek 8360 LO source that is coupling into a DBM500 balanced mixed, you need to add an inductive loop made up from 1/2'' of #24 bare wire as shown in the drawing.

For those with Ham radio capability, Rae is an amateur (WBOPOP) and he checks into the Sunday net at 1800 Z on 14.311 MHz and he will be glad to discuss his experiments with others there.

HEWLETT-PACKARD 6102 Bi-Polar Board

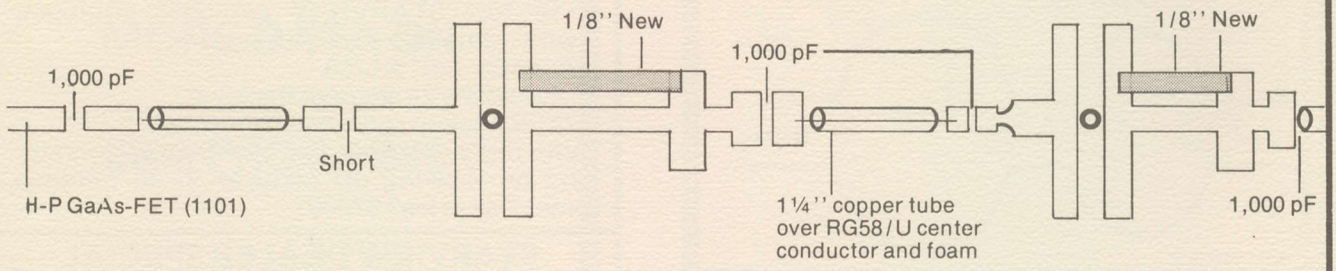
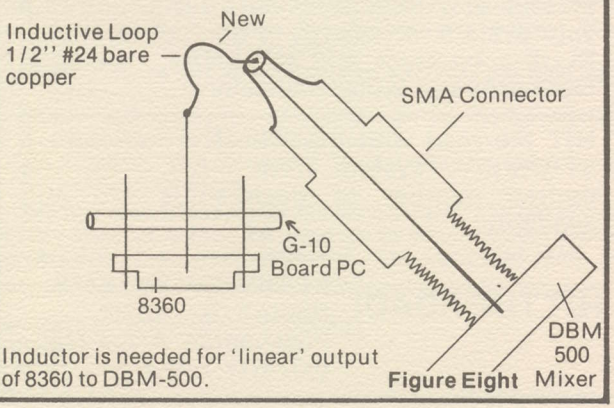


Figure Seven

AVANTEK 8360 VCO [LO]



Inductor is needed for 'linear' output of 8360 to DBM-500.

Figure Eight

MITSUBISHI GaAs-FETS

A line of Mitsubishi GaAs-FET devices suitable for do-it-yourself LNAs in the 4 GHz service are now available in small quantities from **Applied Invention** (RD2, Rt 21, Hillsdale, N.Y. 12529). For 3.7 to 4.2 GHz service there are three devices of interest:

a) **MGF1401** which has a typical noise figure spec of **1.5 dB** (120° K) and typical gain of 10.5 dB per stage;
b) **MGF1402** which has a typical noise figure of **1.1 dB** with 13 dB of gain;
c) **MGF1412** with a typical noise figure of **0.8 dB** (68 degrees K!) and gain of 13 dB.

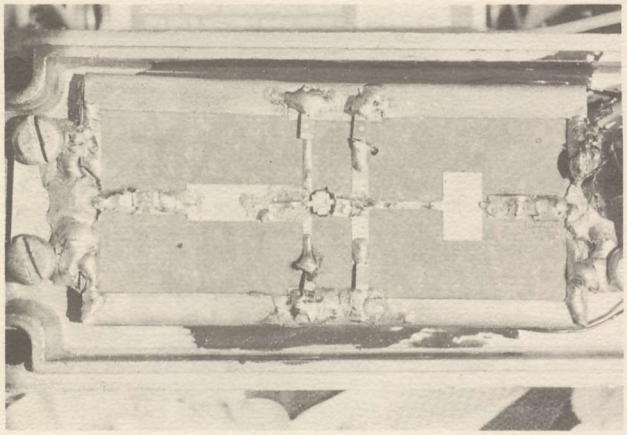
A fourth unit which might make a good 'post amplifier' for 3.7 to 4.2 GHz signals is the **MGF1400** which has a **2.0 dB** noise figure and 9 dB of per-stage gain.

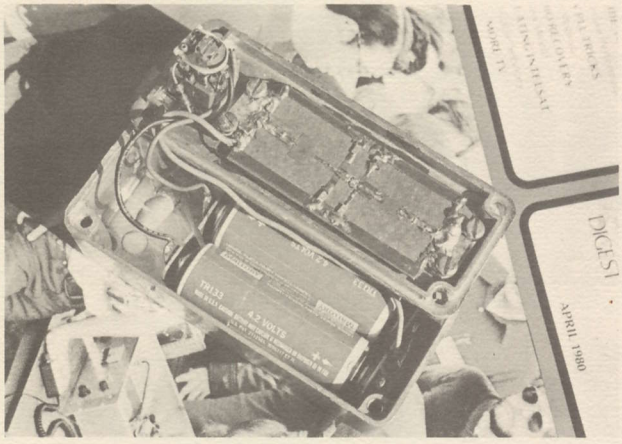
With each device ordered Applied Invention supplies a full set of Mitsubishi data sheets. Pricing on the devices in 1 to 9 quantities within the continental USA is as follows:

a) MGF1400 $24.50
b) MGF1401 $28.30
c) MGF1402 $50.00
d) MGF1412 $75.00

That suggests you could put together an LNA with 30 dB of gain and a noise temperture (after input and coupling losses) of around 100° K for perhaps $127.80 in devices (MGF 1412 + 1401 + 1400); or a high quality 120 degree unit for $102.80 in devices (MGF 1402 + 1401 + 1400). Terms are payment with order, company check or money order.

One enthusiast who has already put the Mitsubishi devices to work is **Bob Luly** (449 S. Sierra Way, San Bernadino, CA 92408). Luly's handiwork is shown here; a 'post amplifier' for producing around 10 dB of gain across the 3.7 to 4.2 band (after, at the tag end of an LNA, on the test bench or to boost the signal after a particularly long run of coax line).





Note that Bob's single stage device fits into a stock self-sealing container and the whole circuit fits up against the bottom side of the top piece. Powering is simply through a pair of 4.2 volt batteries. There are four chip capacitors in the now-familiar input/output lines and two more that couple into and out of the stage. Bob will probably have this unit plus other clever 4 GHz gear stuffed into his back pocket at SPTS '80/California; look for him, he's a clever chap!

4 GHz COAX RELAY

Dow Key (P. O. Box 4422, Santa Barbara, CA 93103; Bob Dysart at 805-684-4560) has a new coaxial relay that may be of interest to those people looking for ways to switch 3.7 to 4.2 GHz RF without losing a bunch of signal in the process. Their new 401-230832 model is a single-pole, double throw relay with greater than 60 dB of isolation, an insertion loss of 0.2 dB (not to be used ahead of an LNA!) and it operates from 28 VDC. Pricing is around $140.

NOISE TEMP vs DEGREES K

Adjusting to the microwave world of measurement is difficult enough without the hassle involved in adapting to a whole new system of noise temperature measurements. To those who come into the 4 GHz world from the relatively safe regions below 1 GHz the non-use of "dB" for expressions of system noise figure is unnerving. Here is a chart which may prove helpful in converting noise temperature in degrees K to the oft-more-familiar dB (of noise).

T° K	=	NF dB	T° K	=	NF dB
10		0.148	105		1.346
15		0.220	110		1.401
20		0.291	115		1.455
25		0.360	**120**		**1.508**
30		0.429	130		1.613
35		0.496	140		1.716
40		0.563	**150**		**1.816**
45		0.625	160		1.913
50		0.693	**170**		**2.009**
55		0.757	180		2.103
60		0.819	190		2.194
65		0.881	200		2.284
70		0.942	210		2.372
75		**1.002**	**220**		**2.458**
80		1.061	230		2.543
85		1.120	240		2.626
90		1.177	250		2.707
95		1.234	**300**		**3.092**
100		1.291			

REF VTR EE MODE

I read the letter from carlton Sawer of page T-15 of the April issue regarding the use of a modulator in the (home) VCR. As far as the RCA VHS machines are concerned his information is faulty. On all RCA VCRs the video is **not** converted before the (video) output.

TECHNICAL CORRESPONDENCE AND NOTES

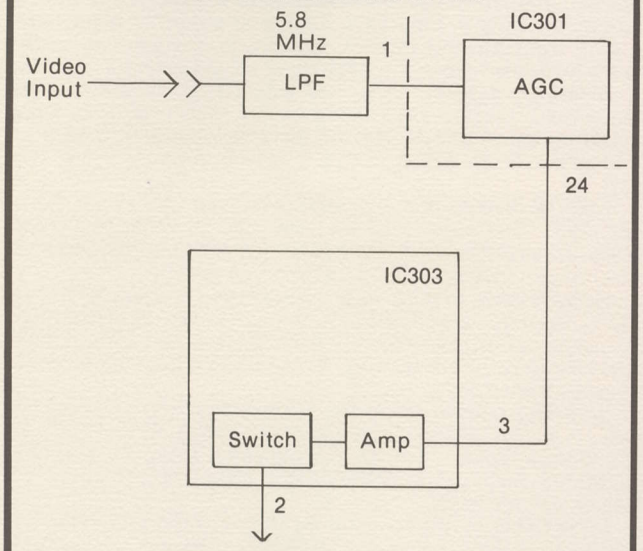
As shown on the diagram (page 3-15) of the technical manual for the VCT-400 VCR, the video is passed through a 5.8 MHz low pass filter, thru an AGC amp to level it, thru a switching network and then out to the video output jack (and to the RF converter). It has been my experience that whatever degradation there may be when you remodulate through the VCR is due to the narrow bandpass filters **in the RF modulator module**, and, because of the modulator's differential phase response which leaves something to be desired in professional circles.

I do not know if the BETA machines process the video in the same manner, but the Panasonic 9000 series U-Matic operate the same as the VHS machines do. And since the RCA table model VCRs are manufactured by Matsushita this information also applies to those 'branded' by GE, Magnavox, Sylvania, Curtis Mathes, Philco and Panasonic since they are also by Matsushita.

It may not be cost effective but the RF modulator is available as a replacement item from RCA distributors; it is part number 144897 and dealer net/wholesale is currently $70.80. As Distributor Service Manager for RCA in this area I would be happy to help anyone who needs assistance. Keep up the good work with **CSD!**

William Bowen
ADI Appliances, Inc.
P. O. Box 954
Toledo, OH 43695

VIDEO PROCESSING IN VHS



Several knowledgeable people wrote on this matter. The bottom line, as Clyde Washburn wrote, is that the signal is not converted in the EE mode. The purpose of the EE mode is to allow the user to view the picture he is preparing to record. In the 'around the horn' flow shown in the diagram filter FL301 removes any high frequency components from the incoming composite video signal. The AGC amplifier insures that the signal routed further on is a reasonably constant 1 volt peak-to-peak signal. From here the baseband signal is applied to the video-play processing chip which buffer-amplifies the video signal to 2 volts peak to peak [which amounts to a volt p-t-p when terminated].

MORE PCM-200 DATA

The plug-in receptacle for the RCA PM-200 MAA001A module consists of two halves; RCA part numbers 135450 and 135451. These are available from RCA distributors for about $1 each. Plug-in beats wire-in especially if you want to change pre-tuned modules for different sub-carrier frequencies.

For the sound output modules, number MAN002A, one connector is needed; RCA part number 133634 and also about $1.

SAMS PHOTOFACT Set number 1300, folder 2, covers the RCA XL-100 CTC-48 television receiver which has these modules but it has two omissions; they left out the chassis connectors listed above and blow up photograph of the MAN002A output module. As for the alignment procedure, it consists of but four lines and no test equipment is called for. The procedure described in the December **CSD**, page T12, covers alignment better than this Photofact! Also, the parts listing for the 'orange drop capacitors' in their external circuitry is wrong; calling for Sprague 600 volt (6PS) instead of the smaller 100 volt (1PS) which are obviously adequate. I suggest users of the PM-200 module for sub-carrier audio detection, per **CSD**, save their $6.50 for the SAMS and apply it towards a second sound discriminator board! Finally, speaking of money, rebuilt modules may be obtained from PTS Electronics (some 43 U.S. locations, they advertise in **Radio Electronics** and elsewhere). I paid $13.50 for each module with no 'dud' to exchange.

Stan Jeffcoat
612 S. 10th Street
Yukon, OK 73099

Well done, Stan. Certainly the PM-200 module described in a couple of issues of CSD this past fall has become a mainstay of inexpensive audio sub-carrier recovery.

WANTS TO START SOMETHING

I would like to start some type of local organization here in the Austin, Texas area for people who are working or building or thinking about building a home TVRO system. Perhaps we could get together once a month or so to exchange information and ideas.

John W. Walden, Jr.
203 Soloma Circle
Austin, TX 78626 (512-863-8852)

This is an idea who's time has come. Anyone who wants to start a local or regional group drop us a note (attention Coop). **We'll run a list of those looking to get groups started and then after they get established list when and where they meet and who to contact. If there is sufficient interest, STT will even make available at a very nominal rental rate our videotape library to use for creating special programs for local meetings. We'll provide the publicity and program material; you'll get together, you hear!**

TECHNICAL NEWS NOTES

HIGHLY SUCCESSFUL first tests of new Microwave Associates 4.6 meter transportable video (audio, data, etc.) UPLINK terminal took place April 7th at Burlington, MA headquarters of firm. In rain drenched session 700 watt TWT output loading into 15 foot region antenna was tested on WESTAR and SATCOM FII (transponder 22 was used even though RCA says it is a 'sick' transponder) producing 51-52 dB signal to noise ratio video at receive end of dual purpose terminal. Exciting as the tests were the pricing for this transportable system is even more interesting. The full system, ready to plug into a local 220 VAC 3-phase source and provide direct video (plus up to three audio subs) into the bird of your choice is $150,000. Yes, that's not in the hobby class but when compared with other prices for transportable systems, it is starting to get attractive. System includes frequency agile uplink transmitter, 700 watt TWT amp, frequency agile receiver, 4/6 GHz feeds and attendent electronics and mechanics. Exact transport cubic feet required is not available but it appears it would go onto a 10 foot U-Haul trailer with ease, fit airplanes of DC-3 and up size with ease. One clever design approach; to weight-down the terminal on site so that it maintains boresight it uses three 'waterbed' containers that are filled with water at installation time, emptied and rolled up afterwards. The first 'Waterbed Uplink'!

BUDGET CUTS apparently left most of the NASA programs (including Shuttle) in place. Only identified 'loss' was 20/30 GHz narrow band antenna system which NASA wanted funded for design phase. Latest Shuttle data shows first **operational** mission (TDRSS-A) now scheduled for March of 1982 and first INTELSAT V (5) launch in August 1982. Same August '82 launch will also handle Telesat Canada ('C' bird). Publication of schedule also showed INSAT 1-A (India) in December of 1982, Palapa B-1 in March of 1983, Arabsat-A in July of 1983.

PROBLEMS with uplink sites continue to plague NPR; they lost 3 kW HPA early in March, reverted to two-channels of audio with 100 watt output.

BATTLE over last orbit spots available for North American heats up with Southern Pacific Communications asking FCC to select them over Hughes and others desirous of far eastern orbit slots. SPC claims they would launch dual band (4 and 12 GHz) birds "each with equivalent of 48 transponders". SPC attempting to build 'case' for 'maximum efficiency of utilization of orbit slots'. In related battle, RCA and WU both want access to 83 degree west spot. Western Union has proposed that they: [1] place (yet to be launched) WESTAR IV at 99 degrees west, [2] move WESTAR I (at 99 now) to 83 degrees, and then replace I with the first TDRSS advanced WESTAR in 1982, [3] place second TDRSS at 91 degrees when it is launched (June of 1982 according to present Shuttle plans), [4] move WESTAR III (now at 91 degrees) to 123.5 degrees (now occupied by WESTAR II). First **actual** Shuttle launch (note operational launch scheduled March 1982) now set for February 1, 1981.

NASA has proposed 'nationwide communications system via a new (yet to be designed) domestic satellite' which would allow two-way voice communications between non-urban areas, two-way communication in metropolitan areas via integrated terrestrial systems, or interconnection between areas'. System would utilize 800-900 MHz band with massive (139 foot) antenna system parked at 110 degrees west offering perhaps 70 spot beams. NASA envisions system by which a 800 MHz range uplink mobile radio (i.e. vehicular communications) would 'talk' directly to the satellite and receive the downlink back in the 900 MHz range. Proposed user cost range projected is around $25 per month for 'unlimited calls'.

UTILIZING 25% of a single WESTAR transponder new Data Communications Corporation plans to install 202 separate transmit-receive earth terminals in 100 major US cities with base of operations in Memphis. Firm plans to utilize 10 meter antenna at Memphis, 4.6 meter antennas elsewhere for both transmit and receive. System is designed to allow private business telecommunication links, via satellite.

SIMILAR system, SBS, has asked FCC to allow it to change the projected locations of its Ku band satellites. Now requesting SBS-1 at 106 degrees (original location), SBS-2 at 103 degrees (from 122) and SBS-3 at 100 degrees (from 125 west).

MOVIE distribution via satellite is eyed by Francis Ford Coppolla ("Godfather" et al). He has directed his new Hollywood sound-lot to prepare for "all electronic creation and distribution" of feature films "within five years".

NEW YORK TIMES now transmitting via WESTAR II SPC transponder a facsimile of each page in next day's edition of Times to new printing facility near Chicago for reproduction and distribution in 9 state area. Trnasmission begins around 8 PM eastern each day.

SHARED USE of uplink facilities by PBS and commercial interests in New Orleans, Houston and Washington, D.C. to get underway soon. Through sharing commercial TV stations and others may utilize WESTAR I channels for relay of occasional video feeds.

LOW COST method of rotating antenna feed suggested by experimenter Robert Coleman; Bob now uses VW windshield wiper motor with limit switches to accomplish quick, positive switching from V to H and back again for under $10 total cost!

HONEYWELL-Spacekom offering 4.5 dB noise figure 11.7/12.2 GHz downconverter that bolts directly onto LNA to convert an existing 3.7 to 4.2 GHz terminal to a 11.7 to 12.2 terminal. Downconverter must be driven by external PLL or free running oscillator; input to converter is WR-75 waveguide flange. Pricing and delivery unknown; contact them at 214 East Gutierrez Street, Santa Barbara, CA 93101 (805/865-1013).

SAW BANDPASS filters covering 70 MHz IF band for standard TVRO systems announced by Andersen (1280 Blue Hills Av., Bloomfield, CT 06002). Model 70-36000-99 has 1.5 dB insertion loss at +/- 18 MHz points and rejects 30 dB at +/-24 MHz.

Contributor Jon Spisar (see **CSD** for April, page T2) suggests anyone building up his PLL demodulator might want to experiment with optimizing the voltage on the MC1496. Spisar has found that for maximum linearity the 1496 likes to see between 9 and 11 volts.

RAMSEY MOVES

Reacting to the dramatic upsurge in business with their various frequency counter, DVM and other kits, plus the impact of their kit and wired and tested Washburn receivers, **Ramsey Electronics** has moved to new and considerably larger quarters in the Rochester, New York area. Effective back in April the new address for Ramsey is: Ramsey Electronics, 2575 Baird Rd., Penfield, N.Y. 14526 and their telephone number is 716-586-3950.

END OF RICHARDSON SERIES

For fans of Bob Richardson's 'World Above 10 GHz' which has been appearing in CSD on a regular basis since last November this note; the present series is now completed and the multi-talented Richardson is now back at his first 'love'; creating fascinating new software products for the TRS-80. We enjoyed having Bob with us for the past six issues and salute him for his contributions to the state-of-our-art!

COOP'S COMMENT ON PROGRAMMING

ON THE WAY TO THE FORUM

A funny thing happened recently at the FCC. They asked an outside (and one pre-supposes probably unbiased) expert on telecommunications to give them his views on how (not if) they should create a DBS (Direct Broadcast Satellite) system for the United States.

David Rice, Associate Director of the Communications Media Center in New York, told the Commission they have three options. Significantly, not one of those options was that they **not allow** DBS systems. Let's see what this is all about.

The Commission has been anxious to get something on paper concerning direct broadcasting satellites. They have been under much pressure to show that they were aware that such a system was under development in other nations and they have been on the receiving end of barbs and jabs from such Congressional leaders as Congressman Lionel Van Deerlin of the House Subcommittee on Communications. Van Deerlin is a forward thinking chap who cannot be accused of wanting to hide new technology under a bushel basket. In fact without his support 'small earth receiving terminals' probably would still be languishing in a state of 'not-here-yet'. Van Deerlin, through his own forum of the Committee he chairs, has let the Commission know that he wants to see DBS get its opportunity to develop.

The present Commission is deregulation minded. That is, they have shown time and time again that they lean towards less government regulation and more marketplace competition. That's an important position since past Commissions have leaned the opposite way for a decade or more and with that leaning has come a reluctance to allow something new to develop in fear that something new might rattle the cage of something established. Those who have a piece of something already established naturally will use whatever persuasive powers they may command to lobby against the introduction of something new.

DBS is new. It could rattle every single one of the exising cages. It is not likely to put any of them out of their cages but it is likely to change the shape and perhaps the size of their present cages.

Rice suggests the Commission may not need any new authority from Congress to create DBS. The Congress may not agree and of course that will add an additional year or so to the time frame between conception and delivery of the new service. Here are some of Rice's more salient points:

1) **Rice says** the Commission could license DBS much in the way it now licenses terrestrial broadcasting stations. The primary hang-up he suggests is the 'local service' concept of the present broadcast scheme. Short of 200 separate 'spot beams' (one for each of the present "200 TV Station Markets"), he agrees that the definition of 'local' may have to be stretched abit. He suggests that it could be by simply looking at 'regions' (such as the Great Lakes, or New England) as the 'local service area' of a DBS licensee. In other words, expand the locale of local.

2) **Or**, Rice suggests, DBS service could be fashioned after something akin to the present Common Carrier regulation where the carrier (the transponder operator) is simply a conveyance service having nothing to do with the programming at all. They simply (as they do now) rent 'time' to anyone who wants to 'broadcast'. The problem with this approach, according to Rice, is that it would preclude the FCC from having any recourse over the programmers since they would (under present law) not be answerable to the Commission. Some might suggest that is not a bad idea.

3) **OR**, Rice suggests, the service might be a hybrid of both techniques; making the transponder operator responsible for all programming that passes through his service but perhaps setting a maximum amount of this time that he could program on his own; thereby insuring that non-affiliated groups would have at least access to the broadcasting system if they could pony up the money for the time they wished to use.

Rice concludes that the technology for initiation of such service is here **now**. He also notes that the regulatory environments at both the national and international level seem to be more and more receptive to such a service all of the time. He cites the FCC's action of last October 18th (in deregulating the mandatory receive-only-terminal licensing) as a positive step that has placed the Commission into a posture which Rice believes "could help pave the way..." towards establishing DBS.

And so the Commission now has a chunk of paper which they can hand to Congressmen and others in authority who are asking the question "What is the Commission's policy regarding establishing Direct Broadcast Satellites?". But the study will cut both ways. Opponents of DBS will pick it apart line by line, word by word. They will shred it up and use it to line the bottom of their cages. It may even provide a rallying point for the various cage dwellers who see in DBS a threat to their present operations.

Years (perhaps as many as ten) from now it **will** all be resolved. There will be many more reports and studies and commissions (and **C**ommission with a capital C) in the interim.

CSD PROGRAMMING

COOP'S SATELLITE DIGEST (Programming Section) is published monthly by Robert B. and Susan T. Cooper doing business as Satellite Television Technology (Ltd.), P. O. Box G, Arcadia, OK 73007 (USA); 405-396-2574. **CSD** is not affiliated with any satellite programming distributor, hardware (equipment) manufacturer or distributor nor satellite systems operator. STT sponsors the Satellite Private Terminal Seminars (SPTS) held three times per year and does produce and distribute 'learning' materials and 'how-to-do-it' manuals relating to the development of the low-cost satellite TV receiving system industry. Subscription fee is $50 (US funds) in advance Canada, US, Mexico; $75 (US funds) elsewhere.

SPACE GROUP FORMS

SPACE VOLUNTEERS

SPACE is asking the membership to 'get involved'. Several interim committees are being formed to deal with the most pressing issues facing the group. Here is a list of those specific areas identified to date:

1)**Legislative/legal research committee**
1)**Regulatory watchdog committee**
3)**Technical advisory committee**

The membership application form also asks new members if they would be willing to volunteer some hours to serve in the new Association's booth at SPTS '80 San Jose and additionally if they would be willing to serve on the Association's Board of Directors. When you send in your membership application, you might attach a letter indicating your areas of interest (if any) in these categories.

SPACE GROUP FORMS

During the **first** Satellite Private Terminal Seminar, held last summer in Oklahoma, several people attending felt there was a need to gather together the pioneers in this field and create a 'self protection association'; a national trade association, as it was suggested, of firms and people interested in seeing that low-cost private satellite receive terminals had the opportunity to grow and develop. Such a group was actually formulated at SPTS '79 but apparently the leadership for the project felt the need was less acute than had been voiced at the Oklahoma meeting as very little came of it subsequently.

The subject came up again at Miami's SPTS and this time it got off the ground. During the final day and the final hours of the Miami Seminar Coop invited several people with what he considered keen insight into the problems facing this new industry to join him on the podium for a series of 'David Frost' kind of discussions. In that group of participants in the last session came Gene Martin of Satellite Television Systems (Star Antenna Company) in Lafayette, Louisiana. Gene told two stories to the group assembled; one about his experiences in Lafayette in bringing into a local municipal auditorium during a 'home show' a blacked out professional boxing match utilizing some clever engineering and lots of luck to bridge the distance to a 100 mile plus VHF TV transmitter over in Texas. And a second story that seemed even closer to home, describing how he and others had joined forces to fight a series of legal manuevers brought against business people in Louisiana by the local Bell Telephone company over the question of individual ownership of the telephone type instruments which each had in his place of business. Gene's position was very simple; anything someone does to upset some other person or firm's established business system is going to draw opposition. Gene asked that those in attendance at SPTS '80 in Miami join with him in creating an international trade association of people and companies interested in seeing private satellite terminals flourish.

Joining Gene in the discussion was Washington communications attorney Richard L. Brown of Brown, Bernstein and Longest. Coop introduced Brown as **the** Washington attorney who had made it possible for the small cable television system operator to survive in a Washington climate where in the early 70's small cable systems, typically owned and operated by small, local business people, were being regulated out of business. Brown pointed out to the group that the development of private earth terminals in many ways was paralleling the develop of the early cable industry. Firms supplying to the field were in the majority small firms specializing in a new product which was untested in the marketplace and unaccepted in the legal framework of American communications law. He went on to note that many of the comments reported by government and opposition forces relating to the development of low cost private earth terminals were 'throw away, headline grabbing statements' untested and untried in either courts of law or the marketplace itself. He suggested that if this young industry was to grow and flourish it had better be prepared to take an agressive stance in its own behalf, and be ready to take an offensive position to battle for its rights.

Well, out of this dialogue (which ran for nearly 45 minutes at the closing session in Miami) has come **SPACE**; an accronym for **S**ociety for **P**rivate **A**nd **C**ommercial **E**arth stations. Now what is SPACE and what is it up to?

SPACE is an international association of users of satellite earth terminals with membership open to users, would-be-users, manufacturers, distributors and dealers in the private satellite receiving terminal receiving terminal area. It has already been incorporated in Washington as a non-profit trade association and formal headquarters are located at the offices of attorney Brown **[SPACE, 1521 O Street NW, Washington, D.C. 20005 [202]387-1856]**. SPACE's initial goals are as follows:

1)**To promote** the interest of the public in satellite communications
2)**To defend** the right of users of this communications technology to co-exist in the communications community
3)**To eliminate misconceptions** about the use of private earth stations in order to eliminate the perception of such uses being a threat to other established services
4)**To establish the rights** of private earth station users to view programs from satellites and to resolve the present questions regarding such use; including, Is permission from programmers (really) required? If so, how is such permission obtained? And, can such permission be withheld (legally) from private users?

GENE MARTIN, appearing at SPTS '80 Miami, urging the attendees to join with him in formulating an international trade association.

SPACE MEMBERSHIP FEES

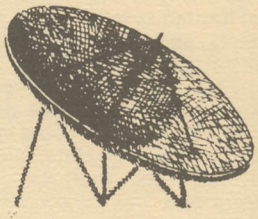
FULL REGULAR MEMBERSHIP - Open to those individuals (private and commercial) who presently own and operate a satellite receiving terminal. Membership fee and first year dues combined is $100.

SUPPORTER MEMBERSHIP - Open to those individuals or firms with no presently operational terminal but who support the goals and objectives of the association. Membership fee and first year dues combined is $25.

FULL ASSOCIATE MEMBERSHIP - Open to original equipment manufacturers supplying any type of hardware for the low cost satellite terminal industry. Membership fee and first year dues combined is $500.

PARTIAL ASSOCIATE MEMBERSHIP - Open to dealers and distributors in satellite receiving system hardware. Membership fee and first year dues combined is $250.

Society for Private And Commercial Earth Stations



5) **To liason** with the Federal Communications Commission, the Congress, and the White House to insure that the low cost satellite technology has an opportunity to develop without government intrusion.

6) **To determine** what the long term rights of such terminal owners and operators are, and to defend the industry's rights to manufacture and distribute such systems.

7) **To develop** both short term and long term goals and strategies for managing the direction of this new industry.

SPACE has established an initial goal to sign up 1,000 members by the July 4-5-6 SPTS to be held in San Jose. The group will be on the formal 'program' at SPTS and STT has donated to the group an 'exhibit booth' so that they can pursue memberships and explain the objectives and goals of the new industry trade association.

Getting something like this off the ground is a big effort. Just the magnitude of organization is a considerable task. In Brown we believe the group has selected the best possible Washington attorney/liason the group could have. Brown has demonstrated repeatedly that he knows his way around Washington, and that he can be extremely persuasive at the FCC, Capitol Hill and even in the White House. Star's Gene Martin is an equally talented individual with both a good track record and a 200% helping of enthusiasm for the project and the long term future of low cost satellite terminals.

RICHARD L. BROWN, appearing during SPTS '80 Miami, explaining how low cost satellite terminals are perceived as a threat by some present users of the technology.

We read this to be a democratic organization founded on the concepts that it will be governed by the membership through a board of directors which will be strictly accountable to the membership for their activities, their use of funds and so on.

On an interim basis, or until SPTS '80 in San Jose in July, a group of volunteer directors will manage the affairs of the new association. These volunteers largely came forward at Miami and asked that they be included in the planning and organization stage of the association. At San Jose the interim directors will be replaced by a member elected set of directors.

CSD has offered 'space to SPACE' here in 'CSD' so that when they are ready the organization can keep its membership advised of progress, battles and activities on some sort of a regular basis. We anticipate SPACE will begin making use of this 'space' in the next few months. **CSD** has also made available 'space' in the current issue of **CSD** so that readers can join up with SPACE before San Jose. On the insert card found between the two sections of this **CSD** you will find a newly designed 'insert card' which includes a segment for joining SPACE. Note this segment is to be returned directly to SPACE at the address given; not **CSD**/STT.

UPDATE INTERNATIONAL SATELLITES AND LOCATIONS

Information regarding the exact locations and operating modes of the various INTELSAT and other (i.e. Raduga and Ghorizont, etc.) video transmitting satellites is often difficult to locate and harder to verify once found. Some of the satellites are 'in-transit' from time to time; Symphonie and Siro (the ESA and Italian) ''experimental'' birds are often moved about to conduct different point to point (via satellite relay) experiments and demonstrations. Thus data on them may be accurate one day and inaccurate the next.

Not all of the satellites operate in the familiar 3.7 to 4.2 GHz band; the Russian geostationary satellites for example operate within a band that starts at 3.4 GHz and moves upward into the lower portion of our familiar domestic and INTELSAT range.

With the new interest in receiving international transmissions (see **CSD** for March and April, 1980), including but not limited to INTELSAT, the need is for accurate data that is timely, and while it does exist getting it verified once found is very difficult.

All satellites are pinpointed in space by 'ranging' exercises; two or more ground terminals triangulate on the satellite, their data is fed to a computer with sufficient capacity to solve the orbit determination and then the results spit out. All satellites maintain their in-orbit position within a prescribed 'box' or square in the sky. A typical box is 70 miles east by west, 70 miles north by south and slightly less up and down. With two exceptions along the Clarke orbit belt, all satellites want to move away from where they are assigned. There are two locations in the belt where the earth's gravitational forces are neutral; one near 104 degrees west and another on the opposite side of the world. All satellites located west of 104 west, for example, just naturally want to drift on their own towards 104 west. All east (from around 15 west) want to drift west towards 104. So the satellites are kept on station by the scheduled firing of small thrusters after ranging experiments indicate that the birds have gotten too close to the edge of their respective 'boxes'. SATCOM FI drifts on its own towards the eastern edge of its box, and then when required thrusters nudge it back to the western edge of the box where the drift starts all over again. There are other forces at work on the satellites as well; the satellites attempt to maintain a location directly over the equator but solar eruptions (caused by the current peak of the sun spot cycle), the pull of the moon's gravitational field and other events work to precess the satellite either north or south of the exact point above the equator. On a normal day the satellite is pushed northward above the equatorial line for about half of the day, and then pulled southward for the other half of the day. This travel is small and in fact neither this movement nor the east-west drift can be 'seen' (i.e. measured or detected) by dishes much smaller than 20 foot in diameter; their beamwidths are simply too wide or broad to notice the slight changes in satellite location.

The larger antennas do notice such movements however and for this reason systems designed to work into INTELSAT, for example, where 50 to 100 foot antennas are designed to track (over at least a small distance of several degrees) the extra engineering workload to boresight all terminals associated with a single satellite becomes considerable if the satellite is not stable; in theory it is far more efficient to work extra hard at keeping the satellite itself close to station than to force several dozen or hundred terminals to follow it around the sky.

PLUS - where as large antennas have a tighter requirement to maintain boresight on the satellite of interest at 4 GHz, the problems becomes approximately 300% more acute at 12 GHz (i.e. ANIK B and INTELSAT V birds now going up) simply because for a given parabolic reflector size the beamwidth narrows to around 1/3rd of the 4 GHz beamwidth at 12 GHz. So station keeping is a continuing task and as the satellite systems move higher and higher into the frequency spectrum the problems associated with station keeping multiply rapidly.

In the April **CSD** we looked at the best reports on hand regarding 4 GHz INTELSAT activities. Overall we found that most INTELSAT birds carry some video, virtually all of which is 1/2 transponder in format, and very little of which is transmitted on a hemispheric beam (and virtually none is transmitted via spot beam). Now let's look at where the 'targets' are for various places in the world.

0 to 75 WEST

Bird Name	Nominal Location
INTELSAT IV-E	1.0 west
INTELSAT IV-A	2.6 west (1)
SYMPHONIE I	11.6 west
SYMPHONIE II	11.6 west (2)
GHORIZONT 2	14.2 west
INTELSAT IV-B	18.5 west
FLEETSATCOM 2	**23.7 west** (3)
INTELSAT IV-AA	24.6 west
INTELSAT IV-AB	27.5 west
INTELSAT IV-AC	34.5 west
SMS-1	**66.7 west** (3)
ATS-5	**70.0 west** (3,4)
LES-6	**74.4 west** (3)

And the footnotes. [1] - INTELSAT IV-A was at 5.01 degrees west back in September. This is an old bird, its usefulness at the present time is unknown, and it may be simply reserving a parking spot. [2] - Symphonie II was located at 11.65 west in October, later was moved to 161.29 degrees in November according to some data. Symphonie **I** should still be located at 11.6 degrees west in any event. [3] - These birds (bold faced) are **not** operational in the 3.7 to 4.2 downlink band. [4] - ATS-5 was located between 5.0 and 5.5 degrees **south** of the equator rather than directly above the equator.

76 to 165 WEST

COMSTAR III	86.9 west
RADUGA 4	**87.1 west** (5)
COMSTAR II	95.0 west
WESTAR I	99.0 west
FLEETSATCOM 1	**99.5 west** (6)
ANIK I	103.9 west
ATS-3	105.2 west (6,7)
ANIK II	106.5 west (8)
ANIK-B	108.9 west
ANIK III	113.9 west
SATCOM II	118.9 west
SIRIO I	121.8 west (9)
WESTAR II	123.4 west
COMSTAR I	127.8 west
SATCOM I	134.9 west
CTS-I	**141.7 west** (6,10)
ATS-1	**149.4 west** (6,11)
SYMPHONIE II	161.3 west (12)

And the footnotes. [5] - This is the 'mysterious' Russian craft that is being maintained 'on station' from either Cuba or Russian ships at sea (the USSR cannot 'see' this Clarke orbit spot directly). This class of satellite is **equipped** to transmit down within the range 3420 to 3820 MHz, on 3895 MHz and within the range 7250 to 7750 MHz. Transmissions between 3420 and 3700 would not interfere with COMSTAR III at 86.9 degrees west nor would transmissions in the so-called 'military' band 7250 to 7750 MHz. However for the 3420 to 3700 region to be utilized the satellite would have to have an input range on uplink which was capable of precluding any signals which upon translation could come out **above** 3700 MHz or transmissions directed at COMSTAR III would also be repeated in the 3700 and up region. Best bets remain that **if** this

satellite is actually in use, it is being used **only** in the 7250 to 7750 region. [6] - These birds are not operational in the 3.7 to 4.2 range. [7] - ATS-3 was south of the equator at 8.0 degrees. [8] - ANIK II is primarily a spare, having been replaced by ANIK-B's 4 GHz capabilities in the spring of 1979. [9] - SIRIO is an experimental Italian 4 GHz downlink satellite with an EIRP capability near 29 dBw; it was probably 'passing through' in transit to some other location when these ranging measurements were made, **or**, the report was in error. [10] - CTS-I (also known as Hermes) was last operational in this location conducting demonstrations of television relayed between Canada and Australia using 200 watt output stages in the 11/12 GHz band. CTS-1 has been formally declared 'dead' subsequently. [11] - ATS-1 remains operational (far beyond its design life) and while it has 4 GHz downlink capabilities most of its efforts in the video area have been at 2.6 GHz where it recently relayed programming for PBS to American Samoa and conducted tests with receiving terminals on Guam. [12] - Symphonie II was reported at this location in November; probably 'passing through'. Symphonie were early experimental birds with 6 GHz up and 4 GHz down, EIRPs in the 29 dBw region, operated by the European Space Agency. During December Symphonie I was utilized to relay television coverage of the test Ariane launch in French Guiana to France. The exact footprint (i.e. whether Global, hemispheric or spot in configuration) is not known.

In addition to these birds which are viewable for most **CSD** readers to at least some extent, we also have:

1)RADUGA 3 at 35.3 degrees east
2)GHORIZONT I at 52.3 degrees east
3)RADUGA 5 at 84.2 degrees east
4)BSE (Japanese experimental satellite) at 109.1 degrees east
5)INTELSAT IV-F at 177.1 degrees east

The Raduga series birds are known to have the capabilities of downlinking at 3420-3870 plus 3895 MHz, as well as the previously noted 7250 to 7750 MHz. The Ghorizont series birds are operational with channel centers at 3695, 3745, 3845, 3895 and 3945 MHz. The non-Clarke orbit birds (Molniya) of the Russians are said to be operational between 800 and 1,000 MHz plus 3400 to 4100 MHz although televsion has **only** been observed at the 3895 MHz frequency. One report notes that 'telemetering' is in the 800 to 1,000 MHz span but neglects to note where in that region it is located.

U. S. DSCS Clarke orbit birds are known to have telemetering at 7250.1 and 7675.1 MHz with downlink operation channels of 7250 to 7370, 7400 to 7450, 7490 to 7675 and 7700 to 7750 MHz. The 7400-7450 and 7700 to 7750 channels sound as if they 'might' be capable of video relay (simply because of their bandwidths).

SPTS '80 CALIFORNIA

- FUN-TASTIC! -

COMING UP FAST

SPTS '80 / San Jose offers low cost satellite system enthusiasts the opportunity to participate in what may well go down in satellite history as the most exciting satellite event of all time. Strong words but an equally strong program is shaping up.

First the basic facts. The dates are July 4, 5 and 6. The location is the San Jose Hyatt immediately adjacent to major north-south and east-west throughway (they call them 'Freeways' in California) intersections and perhaps three minutes by vehicle from the San Jose airport.

At the first SPTS we managed to provide a facility where attendees could bring their own VCR gear and videotape the proceedings from feeds created by the South Oklahoma City Junior College video staff. We missed that in Miami because of the open and 'public' nature of the Bayfront Park Auditorium. SPTS '80 California will bring back the ability to videotape the proceedings with a new twist; you can do it in the comfort of your own room (provided you are among the first 500 to register and thereby get into the San Jose Hyatt).

This will be a very California-style 'satellite-video-event'.

All sessions are planned for videotaping. Then each evening and over a part of the next day (scheduled so as to not interfere with the live program) we'll be feeding back on two separate in-house MATV system channels the day's events. You can tape the events in your own room during playback by simply plugging your own VCR into the 75 ohm outlet in your room. Additionally, we'll have another twenty hours or so of videotape on the system during the three days including some live 'TODAY at SPTS' coverage in the early morning (8 AM'ish) period with studio guests from the program people and attendees at the event. We've even invited the exhibitors to provide us with videotape tours of their plants or installations which we'll schedule onto the in-house MATV system. All in all we estimate a person who wanted to videotape everything we feed out will need around 50 hours of blank tape!

For those who have been looking for the opportunity to attend the **full 12 hour H. Paul Shuch** 'Mini-Symposium' on TVRO System Design, we'll be running Paul's full 12 hours of lectures (from SPTS '80 in Miami) on Saturday July 5th. Anyone who can sit through all 12 hours and still walk a straight line afterwards will have earned a prize for stamina!

And even if you are not into videotaping stuff, and have no desire to do this with the program material offered via the twin-channel system at the Hyatt House, just being there and having access to a 'crash course in technology' may well be an opportunity never to be repeated again. Let's face it...a full 1,000 attendees are anticipated and the size of our group is getting so large that future SPTS events may not be able to offer this type of full menu service.

Now as for new technology - well, there are some hints of it in the various reports appearing elsewhere in this issue of **CSD**. For example, Sat-Tec's new $995 wired and tested receiver (or $695 kit) is sure to create a big crowd. Star Antenna (now Satellite Television Systems, Inc.) has a most intriguing

STAYING AT THE SAN JOSE HYATT

I would like there to be a minimum of confusion regarding just what each SPTS '80 San Jose registrant can expect from the San Jose Hyatt House. We have 'blocked' the full facility; that is, it is ours less a handful of rooms already spoken for. **BUT** - this blocked set of rooms can only be held **until June 13th** (21 days prior to the 3rd which will be the check-in day for most people). **When you register with SPTS** we send you a four page written confirmation, instructions et al **PLUS** a card that **you return** to the Hyatt for the room registration. **NOW - the last date** you can register with the Hyatt and have your reservation held with no deposit **is June 13th.** BUT - if they run out of rooms before then (which now appears very likely) you will be booked into the nearest facility that has similar (although somewhat higher) rates. Can you afford to wait to register for SPTS? **ONLY** - if you don't care where you stay!

Bob Cooper Jr.

DR. ZWORYKIN [left] who is generally credited with the development and refinement of the all electronic television system dropped in at SPTS '80/Miami. He's 90+ years young! (photo courtesy Nelson Ethier, Montreal, P. Q.)

new 13 foot antenna system with total operator-chair remote control. The Howard Terminal Receiver may well be into commercial production by SPTS '80 San Jose (we'll be surprised if it is not!) and Tay has a new rotating feed system he and Bob Taggart of Chapparel have worked out that will cause you to scratch your head in wonderment. The first (and perhaps second) "everything mounts at/in the feedhorn" home TVRO system (full electronics in the antenna feed with a six conductor cable coming down to the set top control box) is also likely to appear at San Jose. One and perhaps two new (to SPTS) LNA suppliers have signed up for display and many new antenna and complete system suppliers are also on the roster. The new '8-Ball' antenna from Hayden McCullough will be on display and another spherical design is promised with no fewer than four simultaneously operating feedhorns each selecting a separate satellite.

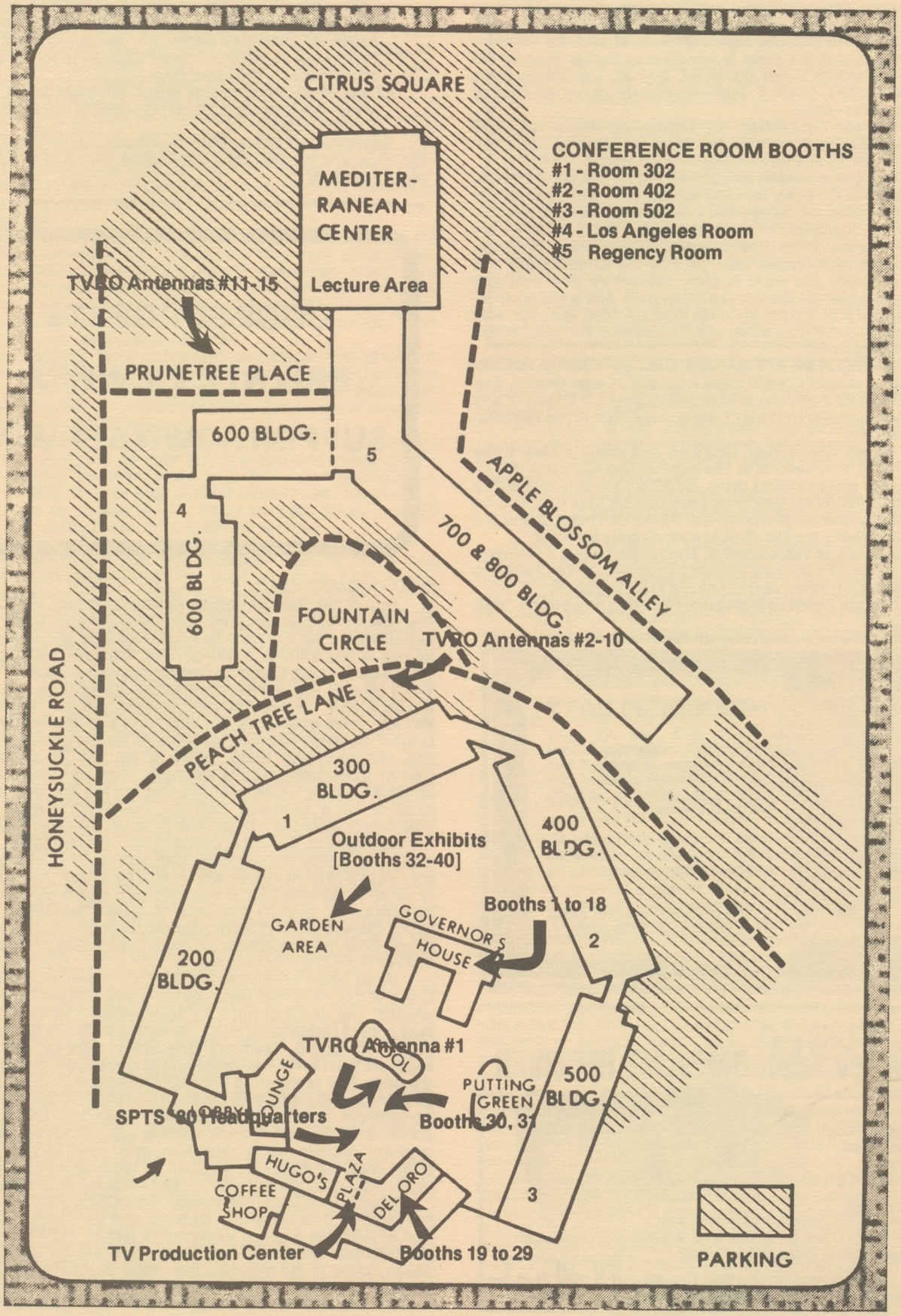
At least a couple of the 'major' (**i.e. CATV type commercial**) firms will be on hand to display their own newly developed 'private TVRO system packages' (sooner or later we knew they'd join us!) and the competition for dealers and distributors is going to be hot and heavy. Virtually everyone who was at SPTS '80 in Miami as an exhibitor will be back again with the emphasis (thank gosh!) on prompt delivery and dealer support programs high on the list.

The San Jose Hyatt facility is quite unique and we'll be taking advantage of that fact. A master sessions area (the **Mediterranean Center** - see layout map) will seat 1,000 at capacity and we'll split it up between high-technical (i.e. engineering) and not-so-technical sessions. We've arranged the three day program so that there will be an almost constant stream of sessions in both areas from 10 AM until into the evening hours on July 4th. **On Saturday the 5th** there will be a full day devoted to exhibit booths, and group demonstrations. We'll keep the twin MATV 'SPTS TV' channels filled all day long but there will be no live seminar sessions that day to insure that you have **a full day** open to really explore the dozens of exhibits and meet and talk with other attendees. On Sunday the 6th we'll have sessions from around 9 AM until 3 PM. The MATV system will repeat the day's sessions until early in the evening so anyone who wants to catch it all had better plan to stay over until Monday AM the 7th.

Many attendees are planning to arrive on Thursday the 3rd. There will be no formal sessions that day; the exhibitors will be finishing their installations, the new industry Trade Association SPACE will hold a general meeting that evening and we'll have material on the MATV system through the evening hours.

Now some answers to some of the questions we are hearing:

1) **What happens after the San Jose Hyatt is filled up?** Lots of people have made reservations **directly** with the Hyatt **prior to** getting from SPTS their official Hyatt registration card. **This is a bad mistake** and we wish you wouldn't try this end run! First of all, you will probably be charged a higher daily room rate this way. Second of all, if you then try to go back and make a second reservation with the official SPTS registration card, you may well cause somebody else to miss the opportunity to stay


CITRUS SQUARE
MEDITER-RANEAN CENTER
Lecture Area
CONFERENCE ROOM BOOTHS
#1 - Room 302
#2 - Room 402
#3 - Room 502
#4 - Los Angeles Room
#5 Regency Room
TVRO Antennas #11-15
PRUNETREE PLACE
600 BLDG.
5
4
600 BLDG.
APPLE BLOSSOM ALLEY
700 & 800 BLDG.
FOUNTAIN CIRCLE
TVRO Antennas #2-10
HONEYSUCKLE ROAD
PEACH TREE LANE
300 BLDG.
1
400 BLDG.
Outdoor Exhibits [Booths 32-40]
GARDEN AREA
GOVERNOR'S HOUSE
Booths 1 to 18
2
200 BLDG.
TVRO Antenna #1
POOL
LOUNGE
PUTTING GREEN
500 BLDG.
SPTS '80 Headquarters
Booths 30, 31
HUGO'S
PLAZA
DEL ORO
COFFEE SHOP
3
TV Production Center
Booths 19 to 29
PARKING

there. Don't do it. If you have reserved space ahead of time, send in the card SPTS provides you for special rates and specific registration to attend the seminar period and **ask them to cancel your earlier** (non-SPTS) **reservation**. After the Hyatt is filled, the people there will start placing late registrants at other nearby motels/hotels.

2)**How can I videotape if I am staying someplace else?** Make a friend with somebody who is staying there. All past SPTS events have been very friendly!

3)**Can I get my family into SPTS?** Only if you pay for them. Badges for entry into the exhibit area will be carefully policed as will badge entry into the sessions be mandatory. There will be one special period on Saturday the 5th when wives and children accompanied by registrants with badges may get into the exhibit areas (we recognize you want to show the family what you just spent several thousand dollars for!). No, your brother-in-law Harry from Milpitas does not look like your wife (we hope for your sake) and he'll have to stay out; unless he registers.

4)**I have all of the STT manuals. Can I get a partial refund?** No you won't; we'll have a couple of **new** ones in San Jose and everyone who registers gets his choice of **any two** manuals in the STT library **as a part of** his registration fee.

5)**I would like to tour DEXCEL and some others while there.** Yes, several of the high technology firms are located within a short drive (DEXCEL for example is five minutes away) and most have told us that they will be happy to arrange a plant tour for either Thursday the 3rd or Monday the 7th. Talk to each directly however.

6)**50 hours of videotape???** That's our ballpark estimate for now. If you are a glutton for punishment and want to tape everything sent out on the MATV system.

7)**How can I tape both channels if I want everything, with only one machine?** Bring two machines. Or, make a deal with somebody else to each tape one channel and then exchange dubs afterwards. No, we can't repeat everything twice at different tiems because if we did nobody could leave before Labor Day!

8)**This whole thing seems either too good to be true or crazy!** Being crazy is not a requirement of attending but it might help!

Registration? See special registration card between the Technical and Programming sections of this issue of **CSD**. See you in San Jose!!!

COOP SUGGESTS PRIVATE VIEWERS SUPPORT OWN SERVICE

DO IT OURSELVES?

One of the major problems faced by the new legal arm of the new SPACE group (see story this issue of **CSD**) is the definition of what a private terminal viewer is, and what rights he has in the scheme of things. For example, can a private viewer access such Common Carrier transmissions as WTBS or WGN (et al)? The carriers themselves are split on this issue; WTBS's SSS believes private viewers are not entitled to service, even when they are willing to pay the fee. WGN's United vacillates between agreeing to accept private viewers and not accepting them. What about the non-Common Carrier transmissions? For example, HBO and SHOWTIME and WARNER's 'The Movie Channel' are **not brought** onto the satellite by a Common Carrier. The programming firms themselves lease the transponder time, set the rates (which are not regulated as Common Carrier rates are regulated, at the FCC) and police the systems. Can such a firm **legally deny** service to a private viewer who is **willing** to pay the rate? Can rates be established for private viewers which are markedly different (i.e. higher) than the so-called 'wholesale rates' which cable firms pay? As regular readers are well aware, 'The Movie Channel' will accept private viewers ($96 per year) but SHOWTIME and HBO will not.

What about off-shore reception terminals (since this is, like it or not - and that depends upon who and where you are whether you like it or not - an 'international' service)? What laws govern reception of HBO, for example, in the Bahamas or WTBS on Grand Caymen? **One study** recently completed **suggests** that unlike the Canadian-US agreement inked back in the early 70's prohibiting internal domestic reception of each other's domestic satellites, there is currently no law or written agreements covering this between (say) the US and the Bahamas or Grand Caymen. **Lacking** such **direct agreements** between nations, such reception (and even re-use of the programming) may well be just as legal as cable systems receiving (under agreement) the same signals within the USA.

Clearly - the picture is unclear. Something those of us who have been at it for some time already know well. Just as clear is that SPACE, as a group designed to tackle, define and then resolve these problems, has its work cut out for itself. And, equally clear is the mandate that these problems need to be resolved.

One school of thought suggests that lacking a clear cut line

of **direct approval** for what private terminals receive, the terminals are on quasi-legal quicksand just waiting for the sheer weight of numers to sink us all into the quagmire. Those from within the new industry who harbor this thought suggest that as a group we should be taking steps to insure that we have some readily identifiable reason for being; pending resolution of the prior stated problems. One suggestion kicked about is that a group of private terminal operators could, if it wished, become (through a group such as SPACE) its own programming entity. That sounds pretty far out until you start to work with the numbers involved. Then it takes on an aura of not only being distinctly possible but even perhaps feasible as soon as the end of this year. Let's see what that is all about.

Premise One

Whether HBO/SHOWTIME/'The Movie Channel' are Common Carriers or not, the people they rent transponder time from are carriers. Which simply means that if you have the change in your pocket to pay the FCC-regulated-tariff, and if the time you wish to purchase on the satellite is available, Western Union or RCA or ATT/GTE **must** sell it to you. They cannot deny you access to their birds.

So what does 'time' on the bird cost? Regardless of what it is, the charges are regulated and therefore the buyer has some (FCC) protection in knowing that he is not being selectively charged a higher (or prohibitive) rate. Let's look at ballpark type figures for our discussion:

1) **INTELSAT** - has just recently lowered its rates. You can now purchase 24 hour (1/2 transponder) video on one assumes (we don't know for sure) a hemispheric beam for $800,000 per year. A lot of money? Yes, but divide it down by an hourly rate. There are 8760 hours in a 365 day year so it works out to $91.32 per hour.

Hey, that is right reasonable!

2) **DOMSATS** - rates vary between Western Union (the highest domestic US carriers) and RCA SATCOM's. Western Union (WESTAR) rates average from 10 to 18% higher than RCA largely because WU likes its customers to take short bursts of service on an occasional (per event) basis rather than contract for fulltime services.

There are three 'classes' of service with RCA; the highest class is a protected kind of service wherein the user is assured that even in the event of a transponder failure (or complete bird failure) that RCA would 'restore' service to the leasee somehow, someway. That one works out to around $1.2 million per year and in our 8760 hour year comes to $136.99 per hour. Folks in the cable service group usually prefer to have this highest-grade or protected service since they know they would be out of business in a hurry should there be one or more transponder failures related to their service offering.

The lowest class of service is pre-emptible and not guaranteed. In essence, if the user has this class under lease he **can** lose satellite distribution if [1] his own transponder quits, or, [2] if someone with a higher class of service loses their transponder. This rate is in the $800,000 range and like INTELSAT it comes to around $91.32 per hour spread over 365 days, all hours.

3) **ANIK** - are in a class all by themselves since nobody has ever **really** bought any time on them. And small wonder; while the rates are not generally known there have been attempts by Telesat to peddle full time unprotected transponders for around $2.5 million per year which works out to $285.39 per hour.

The Canadian rate might make sense in the United States where the total 'market universe' is reasonably large but in Canada where the entire population could fit into California the rates are way out of line.

The premise here is that a group, say a group officially represented by SPACE, would contract for satellite time. In other words, create a 'Viewer Satellite Network' system wherein the members of the group on some type of assessment basis would be paying for the cost of the transponder. If $800,000 is a lot of money per year but $91.32 is an affordable amount of money per hour, how do you get from the larger to the smaller number without tripping over the red ink? Bulk is the answer; a big bunch of people all working together through someone such as SPACE to chip in the nickles an dimes required to pay the bill.

All of this is 4th grade math. Say you have a $91.32 transponder bill to service each hour. What might that cost per SPACE member (or any other group that could bring in sufficient 'bulk')? Well...

1) **At 1 cent per member per hour** (24 cents per member per day) **it would take 9,132 members**. Very quick math, right?

Humm. That seems almost affordable! After all, 'The Movie Channel' churns out 24 hours of television per day for a flat $96 per year and several hundred thousand people are willing to pay that rate (cable customers who get the service via satellite). Our paper projection actually calls for far fewer people (9,132 vs. hundreds of thousands and about $8.00 less per year).

Of course there are not 9,132 private terminals out there... yet. BUT - that number is not that far out of line with where this industry could be within say a year. So none of this is totally blue sky, just a bit premature.

Ah yes, you say, but unfortunately the cost of the transponder time is hardly all that is involved. You also have the cost of uplink. What does that involve?

Well, unless you own your own uplink station, you'll have to take your programming to somebody who does have one and they'll charge you money for using it. How much? The rates vary but if you take the actual cost of utilizing the uplink transmitter (a ballpark charge is $40 per hour) and add to that the cost of utilizing the uplink station's videotape playback equipment (another ballpark-charge of $15 per hour) you now have another $55 per hour to spread amongst the participants. If we have our original-example number of 9,132 people involved that works out to $00.00548 per 'member' per hour or round it off to 55/100ths of a penny each per hour. But on an annual basis that comes to another $47.96 per member per year. Now we are up to $87.60 + $47.96 per member per year or $135.56 per member per year. Unfortunately we haven't addressed two final (but unavoidable) costs for operation yet; the cost of programming, and, the cost of managing or administering the whole system. Can someone estimate what such costs might be? Obviously the cost of programming depends upon the nature and quality of the material. And management...well, the way some of the commercial services seem to be running one could safely apply the old adage that the costs will rise to the level where there is no excess money left over!

So what on the surface looks quite enticing may not be so enticing after all. We started off with a backed-into-number of participants (because it divided easily by one penny per hour) of 9,132 'members'. Obviously if that number were twice as large, the costs would drop 50%. Or if the participant number were 50% as large, the number would jump by 200%.

Premise Two

As nice as having your very own 24 hour transponder

Transponder	Service	Contact	Telephone	Address
1	PTL	Cathy Wallace	(704)554-6080	7224 Park Rd., Charlotte, N. C. 28279
2	**KTVU** [*]	Carolyn McCrory	(212)944-4205	Sat Comms., Warner-Amex, 1211 Ave. of Americas, 15th Flr., NY, NY 10036
3	WGN	Roy Bliss	(800)331-4806	United Video, 5200 S. Harvard,. Tulsa, OK 74135
5	Movie Ch.	Gary Koester	(212)944-4261	Warner-Amex, 1211 Ave. of Americas, 15th Flr., NY, NY 10036
6	**WTBS** [*]	Sel Kremer	(918)481-0881	SSS, Box 45684, Tulsa, OK 74145
7	ESPN	Jim Bates	(203)584-8477	ESPN Plaza, Bristol, CT 06010
8	CBN	Scott Hessek	(804)424-7777	CBN, Virginia Beach, VA 23463
9	C-SPAN	Jana Dabrowski	(703)525-3030	3800 N. Fairfax, Arlington, VA 22203
9	**MSG** [*]	Bill Padillino	(201)337-2225	Five Fir Ct., Oakland, N.J. 07436
9	**BET** [*]	Vivian Goodier	(202)337-5260	Suite 300, Prospect Place, 3222 N. St. NW, Washington, DC 20007
10	**SHOWTIME** [*]	Que Spaulding	(212)880-6621	1211 Ave. of Americas, N.Y., NY 10036
11	Nickelodeon (see 5/Movie Channel)			
12	**SHOWTIME** [*] (see 10/Showtime)			
13	TBN	Bill Miller	(714)832-2950	Box 'A', Santa Ana, CA 92711
16	ACSN	Dave Buckingham	(202)673-7866	Appalachian Reg. Comm, 1666 Connecticut Av., Washington, D.C. 20035
17	WOR	Sam Morse	(315)455-5955	P. O. Box 4872, Syracuse, NY 13221
18	GALAVISION	Fred Landman	(212)557-9050	250 Park Ave., NY, NY 10017
20	TCS Sports	William Strong	(412)36$1-5758	890 Constitution Av., New Kensington, PA 15068
21	**SPN** [*]	Sel Kremer	(918)481-0881	Box 45684, Tulsa, OK 74145
21	HTN	Steve Broydrick	(207)774-6334	465 Congress St., Portland, ME 04101
22	Modern Sat. Net	Dee Michael	(813)541-7571	5000 Park St., N., St. Petersburg, FL 33709
22	**HBO** [*]	Winston Cox	(212)484-1715	Time/Life Bldg., Rockefeller Center, NY, NY 10020
23	**Take-2**[*]	(see 22/HBO)		
24	**HBO** [*]	(see 22/HBO)		

THE CURRENT FI PROGRAMMING STOCK - here is a run-down of the program suppliers who presently offer programming on FI. Bold face [*] services want nothing **to do with 'private' terminal systems.**

might be, it may be a little too ambitious for right now. How about something lesser, say 12 hours a day rather than 24? Can you divide the satellite charges by 2?

No, not quite. Satellite time is sold on a sliding scale where the more you buy (up to fulltime service) the less you pay per unit bought (a unit is an hour). For example, walk in off the street and buy one hour once per year and it will cost you around $900 for that hour (plus uplink and 'deck' time). A 12 hour per day transponder service? It comes, in the lowest class of SATCOM service, to around $111 per hour (versus $91 and change). If you roll uplink time (still around $40 per hour) and 'deck' time (still approximately $15 per hour) into the per-hour-charge on a 12 hour a day bulk buy, you end up with approximately $166 per hour. If you still had 9,132 'members' kicking into the pot that works out to $1992 per day or $727,080 per year which in turn comes to $79.62 per member per year. Again, less cost of programming and cost of managing the whole affair. Humm...perhaps the 12 hour per day approach holds some promise. Are there other things that could be done to whittle it down?

Well, you could buy less than 12 hours per day - say 1 hour per day. But that gets down where the cost per hour for the bird time is getting pretty steep; in the $350 per hour region. When you start taking only an hour per day you are also facing such problems as time zones and perception-of-value (i.e. how much per member could be collected for a single feed of one hour per day?); plus the bigger problem of finding the same hour each day across the board. Remember how busy the transponders are already.

When you really study the time zone problem and others that crop up with 'short days' it begins to appear that for a really worthwhile 'program' the 12 hour day (which HBO and SHOWTIME have been following for good reason!) is a pretty good choice. So what other 'whittling' might be done?

Let's look at the uplink costs. $40 per hour is a bit steep. You have an uplink station (i.e. the equipment), the land upon which it sits, a staff to run it and general management charges. Let's add to that the $15 per hour playback 'deck' time since it is really a part of the cost of the uplinking. That comes to $55 per hour; now what could be done to chop it down to size?

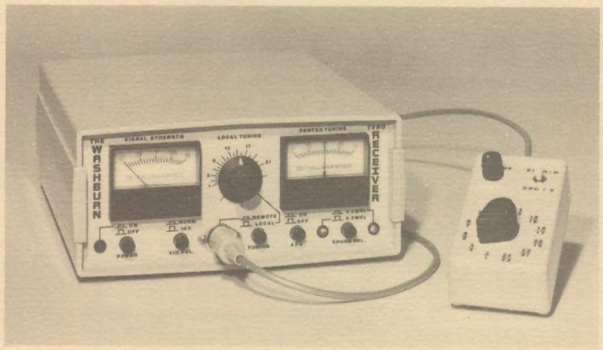
Let's buy an uplink. Egads you say...you've read where they cost $400,000 or $500,000. Check this month's Technical News Notes; there you'll find that Microwave Associates has a new 'transportable' uplink for around $150,000. Remember, big numbers look big only until you apply the 'bulk' to them.

Say you wanted to finance a $150,000 uplink over a quick write off three year period. With a 12 hour on-the-bird day. That works out to 13,140 hours of actual use over the finance-it period. Before we apply the two numbers together let's add another $25,000 for a building to put it in and the land it sits on plus the legal fees to get it licensed. Then let's go all out and put inside the building, along with the uplink electronics another $25,000 in playback and control equipment. That gives us a total investment of $200,000, spread over 13,140 hours of use. Divide it out and you see that we have a per-hour cost of $15.22! That is certainly a lot better than $55 per hour and

THE WASHBURN TVRO RECEIVER

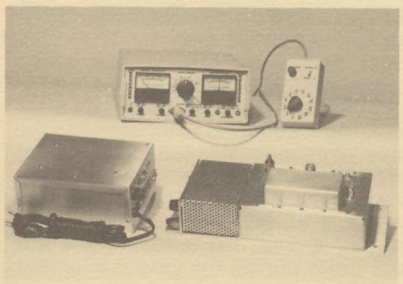
The WASHBURN TVRO RECEIVER is a complete, high performance unit which provides excellent quality picture and sound reception from television satellites. The easy to operate format makes the WASHBURN receiver ideal for any application where non-technical users are encountered, such as the home, job site or resort. Advanced state-of-the-art, technical features such as; extended threshold demodualtion, full band width video and wide range AFC insure professional quality performance for years to come.

The WASHBURN, receiver of the 80's!



STANDARD FEATURES:

- ***EXTENDED THRESHOLD***. . .a state of the art approach to threshold extension that allows sparklie-free reception of program material with CNRs of 8 dB and above, achieved with-**out** compromises in IF bandwidth or video bandwidth and with special design attention to maintaining video phase and amplitude linearity as one would expect to find in a high dollar commercial receiver package.
- ***LOW DISTORTION AUDIO***. . .a unique approach to recovering **all** of the audio bandwidth present on the satellite transmission utilizing a true low-distortion, low-noise, high fidelity audio output with remote control and **automatic** selection of either the 6.2 or 6.8 MHz sound subcarriers; with indicators to show which audio subcarriers are present and a priority selection system so that the presence of some other modulation format (such as slow scan video) on 6.2 MHz will not be selected for listening (but a **normal** audio modulated subcarrier on 6.2 MHz on a different transponder **will** be heard.) Additionally, CCITT (or ANIK) subcarrier frequencies different from the normal 6.2 and 6.8 MHz North American DOMSAT bids can also be received and deemphasis supplied by component value changes.
- ***HIGH PERFORMANCE AFC***. . .that works as well as the RCA home receiver Colortrak® system and provides a very high overall level of dispersion cancellation, eliminating any need for a complex and expensive frequency synthesis system.
- ***AUTOMATIC AND PRECISE***. . .feed rotation control using a readily available, modest-in-cost (TV) antenna rotor assembly.
- ***FULL FUNCTION METERING***. . .dual meters to show received signal carrier to noise ratio (CNR) and AFC center tuning. Meters calibrated directly in db and MHz.
- ***VTR COMPATIBLE INPUTS AND OUTPUTS***. . .to provide easy back-feeding of a home (or neighborhood) MATV system, plus simple off-bird-recording without additional switching or complex cabling.
- ***PROFESSIONALLY DESIGNED AND MANUFACTURED***. . .utilizing an out-of-the-way down-converter (mounting separate from the demodulator proper) with an LNA power supply, a feed rotation system (to allow operational remote control of the feed point antenna for separate reception of vertically and horizontally polarized transponders), a small demodulator console with full provisions for constant monitoring of the system performance, and, a hand-held remote control that allows the viewer to adjust the system to each of the 24 channels found on SATCOM birds (or alternately 12 or ANIK, WESTAR birds) with a remote control. This design allows operation by a non-technical viewer without the requirement for special instructions.



WASHBURN RECEIVER, *fully aligned with one year parts and labor warranty*..... **$2995.00**

WASHBURN RECEIVER, *kit form, 90 day parts only warranty, less rotor motor* **$1495.00**

ramsey electronics **2775 Baird Rd., Penfield, N.Y. 14450 [716]586-3950**

chances are very good the gear will last far longer than 3 years (13,140 hours). Now what is missing? Someone to run it and around 5 kW of electricity per hour. Let's be generous again and add $10 per hour for these overhead items. Now we are at $25.22 per hour; **a savings of $29.78** from our 'pay-somebody-else' overhead of $55 per hour total. That $29.78 per hour saved applies directly back to what it would cost each 'member' per year. At the 9,132 member number it saves him (or her) $14.28 per year. Which brings the 12 hour per day (365 day per year) cost-per-'member' down from $79.62 to $65.34 per year. How does that work out per hour in a 12 hour day? It works out to 1.5 cents per hour or 18 cents per day.

Now that begins to seem quite reasonable again.

But that still leaves us with the programming and management? Yup.

On the surface people pay charges like $5.41 per month ($65 per year) for things such as Home Theater Network; that six-day-per-week, one movie per night service that grabs off the use of transponder 21 every weekday evening (plus Saturday) for a couple of hours. HTN is a good bargain in the marketplace simply because if the family that subscribes to the service sits down to one premium movie per month they've more than got their $5 back. But how would a user group, such as the 'Viewer's Satellite Network', command a paying clientele in the 9,000 size range?

One suspects there are already as many sports and movie and entertainment and religious channels available on the bird as can be supported. Besides the thrust of this is to create a service channel which appeals to and applies primarily to **direct viewers**, not via-cable inter-connected viewers. And for now and the next few years the chances are pretty good the number of such terminals is going to be (in the cable TV universe) quite small. This suggests renting movies, scrounging old sitcoms, digging up old sporting events is not the answer.

One on-satellite service that started out much the same way is SPN; Satellite Program Network. When SSS launched that service in February of 1979 it ran only a few hours per day. It went into the marketplace and offered 'satellite time' for very reasonable rates; as low as $40 per hour in some instances. SPN also went to the cable operators and offered them **free-use** of the channel. For as little or as much of the 'broadcast day' as the cable system wished.

Then a funny thing happened. Hundreds of cable systems took the service. Pretty soon SPN was onto cable systems serving more than 2,000,000 US homes. People who **bought** SPN program time found that whatever it was they were selling with their time (many used their time to entertain/educate and then push products produced or distributed by the program producer) was selling very well. They were making a profit; sometimes a big one. So SPN went from a bold, innovative service that offered time at a very reasonable fee to a service that now charges minimum fees in the $400 per hour region (for 7 AM eastern on Sunday morning!). Obviously this priced some of the program suppliers[*] out of the marketplace (those who were either not selling a product or who were selling something that didn't have any real marketplace in the first place).

If SPN's $400 per hour minimum rates are too steep for some, there is a message here about the dollar potential for anyone with transponder time available. A service that starts out to attract big viewing numbers is bound to end up collecting big user numbers as well. It's just how capitalism works.

***Coop's Satellite Magazine, a fixture first of transponder 24 and then for the past year on transponder 21 left the air after the last week in April because SPN rates raised dramatically to $400 per hour in the 7 AM Sunday [eastern] time slot and considerably higher than that in the familiar 12 noon eastern Thursday time slot. This one hour program had been created and produced by Coop primarily as a means of insuring that people who wished to be kept abreast of the rapid development in satellite and cable teachnology would have the opportunity to do so. Present plans are to return the program to the satellite this coming September in perhaps a different format.**

If there is already too much 'entertainment' on the bird, what about education? Well, there may be something here. Let's go back and look at the cost per 12 hour day for a Viewer's Satellite Network. Less programming and management, we whittled the per hour cost down to $136.22 (satellite time **plus** three year amortization of the uplink site and equipment **including** $10.00 pe hour to run it). Could enough of the twelve hour day be 'sold' so that the remainder would be "free" to VSN members? Possibly.

Each twelve hours of such a project would eat up $1,634.64 (12 x $136.22). Suppose you set out to 'sub-let' **six** of those hours for sufficient money to cover **all** of your daily operating overhead, and still leave you with the remaining **six hours free** of any satellite time or uplink costs. That works out to $272.44 per hour you would charge out to one or more of those 'small groups' who are so anxious to get on the satellite. Since that fee includes use of your uplink and deck charges, guess what. You are actually very competitive with others who would be agreeable to leasing out short blocks of time. In fact, you are cheaper than most.

And now you have six hours free of cost!

Humm. If you could rent 12 hours per day of transponder, put in a $200,000 uplink installation and man it...and turn around and sell just **half** of that time per day and end up with the other half free of any charge, it starts to make some sense why people and firms are getting into the satellite business!

Now let's return to the programming and management portion of the equation.

Elsewhere in this issue we see that SPACE is off and running and the annual membership fee is going to probably end up (after Board decision) being in the $100 range. And we have suggested throughout this piece that if SPACE were, as a group, to enter into the creation of a Viewer's Satelite Network, it could with 9,132 members contract for 12 hours per day of satellite time and provide the membership with their own channel for around $65 per member per year. We have also seen that if you arbitrarily set out to sell say 50% of that 12 hours (six hours) to others for another rather arbitrary (but below present market price) $272.44 per hour (including all uplink charges) that the membership could end up with **six hours a day** of their own programming **for zero dollars**; provided the programming was free and (SPACE) management didn't eat up big dollars in running the project.

The premise here from the beginning has been that this would be a "Viewer's Satellite Network". And since these viewers are all primarily interested in one single thing (low cost satellite service) could not the remaining six hours be devoted entotle to programming in that area?

Remember that by selling off six hours, buying our own uplink (and financing it over three years) we have managed to drop the cost per member per year to $00.00. And the annual membership is forecast to be in the $100.00 per year region. Now what kind of dollars might **really** be required to program that six hours per day, 365 days per year, with material that is not found on the other transponders and which does by intent appeal directly and largely to the VSN supporters (i.e. SPACE members)?

Suppose SPACE's board decided to allocate $25 per member per year (out of $100) towards management of not only the affairs of the association but also the management of the Association's VSN service? At the 9,132 member level that comes to $228,300 per year (remember how far the whole private universe is today from the 9,132 level!). Now suppose the same amount of money ($25 per member per year) went into a production budget for the creation of programming for VSN; programming approved by the Board, supported by the membership (who would ideally participate in its creation by becoming where applicable 'video correspondents' who would submit materials on videotape to VSN/SPACE) and produced as economically as possible by and for the 'network'. If you planned to repeat each four times during the year (i.e. create 25% of the total hours in original programming and repeat for purposes of making viewing times attractive each program four times) you'd end up with a total of 2,190 hours of VSN materials per year and 547.5 hours **original** (i.e. new each year). With a budget of $228,300 (25% of the total membership fees at the 9,132 member level) that comes to $417 per hour as a

budget. What can you produce for $417 per hour?

You'd be amazed. For example, a two man crew plus 3/4 inch equipment could spend one full eight hour day with Taylor Howard for less than $417 at going **commercial** rates. Or Robert Coleman or Clyde Washburn or David Brough (etc.). If a semi-volunteer crew from SPACE membership did the field work, the costs would fall by 50% or more. And out of such a visit with just one of these chaps could come perhaps 4 hours of edited material. Ready to roll on VSN!

Or look at the present STT library of low-cost satellite technology videotapes. Between the first two SPTS events and all of the field sorties Coop has made since this whole craziness began, we find around 100 hours already produced and ready for airing; that's roughly 20% of a full year of program material just sitting there ready to be used!

A True Viewer's Network!

Yes, it all looks quite intriguing on paper. Double-yes, we started out with a rather backed-into number of 9,132 'network members' and that **is** an unrealistic membership goal for a group such as SPACE for the next year or more.

But through all of this we hope you have learned that the economies of bulk (or 'scale') that apply to satellite networking are very real and everyone involved in the satellite revolution should recognize that they exist.

There has been a bunch of numbers in this reporty and we suggest that if you have gotten this far you should **immediately go back and read it all over again** to become more familiar with some of the critical numbers.

This has been a 'think piece'. The numbers are real. The potential to accomplish exactly what is outlined here is real; on this or a smaller scale. The number of 'small terminal enthusiasts' is growing every day and in the not too distant future the kind of 'critical mass' assumed here for this particular set of numbers will be available. The opportunity to establish this type of service will pass by only one time. And the time to start planning for it, through SPACE perhaps, is now. The coming SPTS '80 in San Jose could well be the time and the place to start the ball rolling!

PROGRAMMING CORRESPONDENCE

VIEWING IN SWEDEN

I have read your material with deep interest and would like to pursue the possibility of utilizing a parabolic antenna here in Stockholm to access the TV satellites aimed at the North American continent. Is this feasible? My intention is to tape on our VCR the U.S. programs from various sources in the U.S. and then replay them for our Embassy staff and families. At the present time the two to four week delay makes the programs quite old by the time we receive them here in Sweden.

Adriaen M. Morse
First Secretary
Embassy of the United States
Stockholm, Sweden

Sorry, U.S. domestic satellite signals do not cross 'over the pole' into Sweden. The only signals that cover a wide area and cross the pole are from the Russian Molniya series satellites and we doubt that's what you want to show off to the American staff there in Stockholm! However, with your 'pull' we suspect you could get into the now under construction INTELSAT system which will be carrying U.S. programming to foreign U.S. bases spread around the globe and due to start operation late this year. In the interim you'll have to run videotapes into the Embassy via diplomatic mail pouches. (Wonder if they worry about copyright problems with those tapes!)

UPDATE ON '8 BALL' ANTENNA

Hayden McCullough's **Vidiark Electronics Development Company** (P. O. Box 57, Salem, Arkansas 72574) is going to be close to schedule with delivery on their '8 Ball' spherical antenna described in the April issue of **CSD** (see page T10). McCullough reports he expects to begin delivery of the 12 foot antenna around the 15th of May.

The antenna is in the spherical family and Hayden describes the geometry ''pure Oliver Swan'' although the mechanics of the construction and design are pure McCullough. Like any member of the spherical family you can 'change satellites' by simply relocating the feed (leaving the reflector stationary) or alternately install two or more feeds for simultaneous reception from two or more satellites.

The production version of the antenna (kit) is priced at $475. McCullough tells us that while the original antenna used strips cut out of 1/2 inch (marine) plywood for the support system for the window screen reflector surface he has since upgraded to a good grade of Redwood after determining that the Redwood is likely to last 'decades' while the plywood might not make it through a difficult winter. Redwood is of course more costly than plywood and thus the price increase.

What you get for $475 is everything you need to assemble a 12 foot '8 Ball' antenna. The steel members are cut and drilled and primed. The redwood pieces are cut but you will punch your own holes in each strip (perhaps a one hour job total time with a hand drill). All bolts and other hardware including a detailed assembly manual amply illustrated with photos is included. The price is FOB Salem, Arkansas and includes the crating cost of the materials.

The reason for utilizing redwood (or other wood) strips is to provide a low cost method of attaching the reflective screen to the spherical surface. You do this with a staple gun. That's about all that Vidiark does not supply; the staples, since they must mate the particular brand and model of staple gun used.

McCullough says the feedhorn for his antenna is also nearing completion as a production item and he hopes by the middle of May to be able to supply not only the full reflector system (kit) but the feedhorn as well . Pricing on the feedhorn is not established yet but he feels it will be substantially below the present $80 price range of conventional horn antennas.

McCullough recently constructed, with the assistance of Canadian David Brough, a 16 foot version of the antenna and reports that sometime this summer a 16 foot version will probably be added to 'the line'. McCullough's Vidiark will be exhibiting at SPTS '80 in San Jose and we predict he will be a very busy guy there!

ADM antenna shown in Miami has undergone considerable structural improvement and now boasts new heavy duty paint surface plus improved surface accuracy. Firm is also bringing out extension panels to enlarge surface area to 13 feet and hopes to show a motorized 4.6 meter at San Jose in July.

BIRD OPERATIONAL NOTES

RESULTS IN CARIBBEAN and Central America starting to come back following SPTS '80 Miami event and first introduction of low-cost TVRO systems in area. One SPTS delegate took 11 foot ADM antenna plus 100 degree LNA and AVCOM receiver back to **Bahamas** where he found sparklie-free reception on at least five FI transponders (including 7, 11, 20 and 23) plus well-above sparklie reception on WESTAR and COMSTAR birds. He later upgraded ADM 11 foot antenna to 13 footer with proto-type extension panels supplied by ADM and improved reception even further. Similar results in **Dominican Republic** with 13 foot H & R, ICM receiver and 120 degree LNA. Down in **Costa Rica**, experimenters Erik Roy and Jose Ignacio report Roy's home brew five meter (window screen surfaced, wooden rib) dish equipped with ICM receiver and 34 dB gain Dexcel LNA has produced sparklie-free reception on COMSTAR D3 bird transponder 23 (used for transmission of remote network baseball games back to network headquarters); other tests continue in this pioneering effort. This note: COMSTAR watchers note typical aural sub-carriers are on 5.8 MHz for program feeds.

COMSAT GENERAL and Sears have broken off negotiations which both had previously announced as 'leading towards' the marketing of low-cost 12 GHz private earth terminals. COMSAT said they 'intend to continue exploring alternatives'...Sears said they regard the business 'consumer attractive'.

SCIENTIFIC ATLANTA is offering cable firms (and others we assume) a special 'package' of equipment which they dub 'The Second Earth Station Package'. Included is a 4.6 meter antenna, dual polarized (with ortho-coupler), a single 1.5 dB LNA, a model 6601 single channel receiver, appropriate jumpers plus 100 feet of downline cable and a pressurization kit for the coax line...for $8,685.

BATTLES OVER finding a 'permanent home' for Ted Turner's Cable News Network continues; Turner worked out court settlement with RCA that gives him right to 'temporary use' of transponder on SATCOM FI, through end of this year but subject to pre-emption if there were other transponder failures on guaranteed service channels. It appears as if Turner **will begin** service on June first start date with CNN but transponder assignment is still somewhat up in air (despite what you may have heard!). CNN suggests 14 (on FI), but other sources note 14 has been 'ill' with the burps for several years and 15 or 19 appear more likely. Advice? Watch closely around June 1, before that keep tabs on 14, 15 and 19 on FI for signs of video 'testing' (sure to start a week or more in advance with color bars) that indicates transponder is being readied for new service.

CHANNEL ASSIGNMENTS on COMSTAR D-2 were finally released by RCA. They held 'out-of-the-hat' impartial drawing early in April to determine which service gets what D-2 transponder. D2 is located at 95 degrees west and footprint map(s) for it plus extensive discussion of what it is capable of appeared in **CSD** for April. Here is line up announced:

Transponder	Service
9 (V)	ESPN [1]
11 (V)	Rainbow Communications [2]
13 (V)	Southern Satellite Systems [3]
15 (V)	Showtime [4]
17 (V)	HBO [5]
18 (H)	HBO [5]
19 (V)	Satellite Communications Network [6]
20 (H)	SIN [7]
22 (H)	TCS [8]
23 (V)	United Satellite [9]
24 (H)	National Christian Network [10]

And the footnotes. [1] ESPN has stated they intend to use their second (they are on 7 on FI) for 'backfeeding' live sporting events to their New England operations center. [2] Rainbow Communications is new 'Prime Time Network' design for 12 hours per day slanted at people over 50 years of age. [3] Southern Satellite systems may have no immediate plans for this transponder and in the event of failure of CNN to stay on FI the CNN service could end up here. [4] Showtime has no immediate plans for service using this transponder. [5] HBO probably will not initiate service on either of these transponders before late in 1981 or early 1982. [6] Satellite Communications Network is making a lot of noise about combining sports and movies into an Ohio-centered premium service for midwest. [7] SIN possibly will use this transponder to make their Spanish Language Network programming available to cable systems. [8] TCS is Pittsburgh based sports service which has been utilizing occasional time on FI transponder 20. [9] United Satellite's plans for this service (they lease FI, transponder 3 for WGN) are unknown. [10] National Christian Network (NCN) plans a 24 hour a day religious programming channel.

Remember that D-2 is likely to have hotter footprint in all portions of the U.S. (and southern Canada) than the best-case FI transponders and areas such as Bahamas are in much better shape with D-2 than with FI.

INTELSAT reduced rates for users of intra-nation feeds (i.e. domestic service); full time (½ transponder) video (with audio) now costs $800,000 per year; a 20% reduction. Countries affected include Algeria, Brazil, Chile, Columbia, France, India, Malaysia, Nigeria, Norway, Oman, Peru, Saudi

SPN PROGRAM SCHEDULE

1980 SPRING/SUMMER

EASTERN TIME	PACIFIC TIME	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
7:00	4:00	INTERNATIONAL BYLINE					VIDEO CONCERT HALL	
7:30	4:30	MOVIETOWN						
8:00	5:00							MONSTER FLICKS
8:30	5:30						DAVID GRUEN	
9:00	6:00	DAVID GRUEN		CANADA NEWS FROM HOME	DAVID GRUEN		HEARTBEAT	
9:30	6:30	FRAN CARLTON					PAUL RYAN	
10:00	7:00	MOSTLY MEDICINE	JOURNAL: AN ELECTRONIC MAG.	DAVID GRUEN	FINANCIAL INQUIRY	RUFF HOUSE	MOSTLY MEDICINE	REX REED
10:30	7:30	HEARTBEAT WEST					GOLF LESSONS	WORLD LEAGUE WRESTLING
11:00	8:00	PAUL RYAN					JIMMY HOUSTON OUTDOORS	
11:30	8:30	CHEF'S SECRETS					CHAMPIONSHIP FISHING	JIMMY HOUSTON OUTDOORS
NOON	9:00	DON KENNEDY'S SPOTLIGHT					WORLD LEAGUE WRESTLING	GOLF LESSONS
12:30	9:30	INTERNATIONAL BYLINE						MOSTLY MEDICINE
1:00	10:00	MOVIETOWN					ENGLISH CHANNEL	JOURNAL: AN ELECTRONIC MAG.
1:30	10:30							FINANCIAL INQUIRY
2:00	11:00							TELEFRANCE
2:30	11:30							
3:00	NOON	CHEF'S SECRETS					CHEF'S SECRETS	
3:30	12:30	PAUL RYAN					DON KENNEDY'S SPOTLIGHT	
4:00	1:00	HEARTBEAT WEST					MONSTER FLICKS	
4:30	1:30	FRAN CARLTON						
5:00	2:00	MOVIETOWN						ENGLISH CHANNEL
5:30	2:30							
6:00	3:00						COWBOY FLICKS	
6:30	3:30	FINANCIAL INQUIRY	CANADA NEWS FROM HOME	MOSTLY MEDICINE	RUFF HOUSE	JOURNAL: AN ELECTRONIC MAG.		
7:00	4:00	VIDEO CONCERT HALL						
7:30	4:30	REX REED	CHEF'S SECRETS	DAVID GRUEN	JIMMY HOUSTON OUTDOORS	CHAMPIONSHIP FISHING	RUFF HOUSE	RFD HOLLYWOOD SOMETHIN' SPECIAL
8:00	5:00	This time period has been assigned to a pay T.V. service. This pay T.V. programming cannot be carried without that vendor's specific authorization. The SPN signal contains cuetones which can enable the SPN user to automatically bridge this pay T.V. time period. Cuetone 517# indicates end of SPN segment and 517* indicates start of next SPN segment						
8:30	5:30							SILENT FLICKS
9:00	6:00							
9:30	6:30							
10:00	7:00	DON KENNEDY'S SPOTLIGHT					REX REED	SPN MOVIE
10:30	7:30	WYATT EARP					RFD HOLLYWOOD SOMETHIN' SPECIAL	
11:00	8:00	BILL COSBY						
11:30	8:30	VIDEO CONCERT HALL						
12:00	9:00							
12:30	9:30							WORLD LEAGUE WRESTLING
1:00	10:00	ALL NIGHT AT THE MOVIES						
7:AM	4:00							

Arabia, Spain, Sudan and Zaire.

TIME Magazine now using domestic plus INTELSAT to send full page layouts to Hong Kong plant where Far Eastern edition is put together.

SHOWTIME has increased service hours to 12 hours daily; starting programming at 3:30 PM eastern (TR 12) and pacific (TR 10) weekdays and 1:30 PM weekends. **SPN** has added re-runs of "Return To Peyton Place" and "Dark Shadows" in 10 PM to midnight EST slot on TR 21 in what they bill as 'Network For Working Women'. **CALLIOPE** (TR 9) is adding Saturday morning kiddy shows to line-up. **ESPN** has increased hours six per day, now signs on at 7 AM eastern weekdays. **HBO** is planning to launch new 24 hour service ('Maxi') during May; will utilize transponder 20 for feeds. 'BBC In America' (new service scheduled to bring six hours per day on TR 20 of BBC programs) has been put back and will not appear before end of this year; then over on COMSTAR.

NPR, inspite of uplink problems, now plans to grow to six audio channels this summer on WESTAR (now four) with down-the-road plans to have as many as a dozen.

SKYVISION, a marketing firm in Chicago, is selling satellite services to apartments and condominiums. They install terminal, wire up building (or plug into existing MATV system) providing up to 7 channels at $15.95 per outlet per month. Package includes The Movie Channel, Nickelodeon, WTBS, WOR and ESPN. Installation cost per location is quoted at $40,000.

IN CANADA, All-View Interphase Systems (Mississauga, Ontario) has begun promoting NETWORK ONE leasing earth terminals to homes, apartments. Service is promoted for direct reception from **ANIK** but of course can also receive SATCOM.

ASSOCIATED PRESS offering 'free $10,000 earth station' to any newspaper members of AP who are into high speed service. AP wants to convert all users of service to satellite.

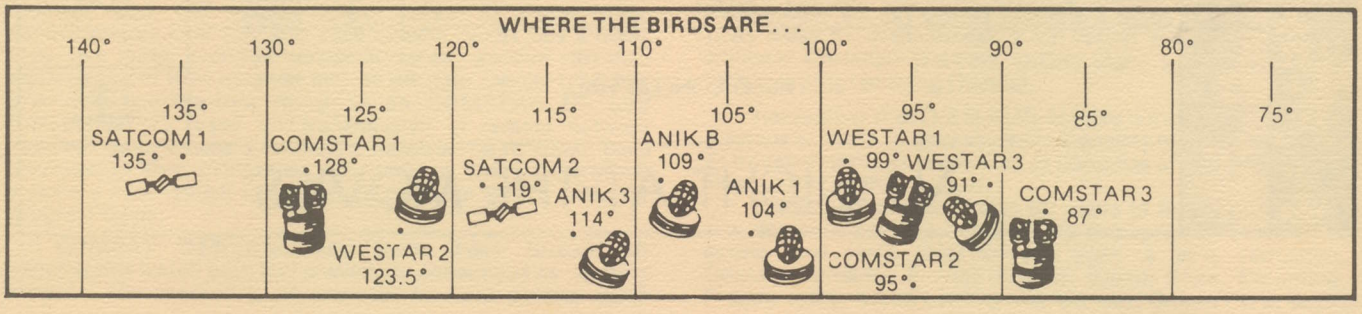
RCA AMERICOM has moved to 400 College Road, East, Princeton, N.J. 08540 (609/734-4000) if you need to get ahold of them.

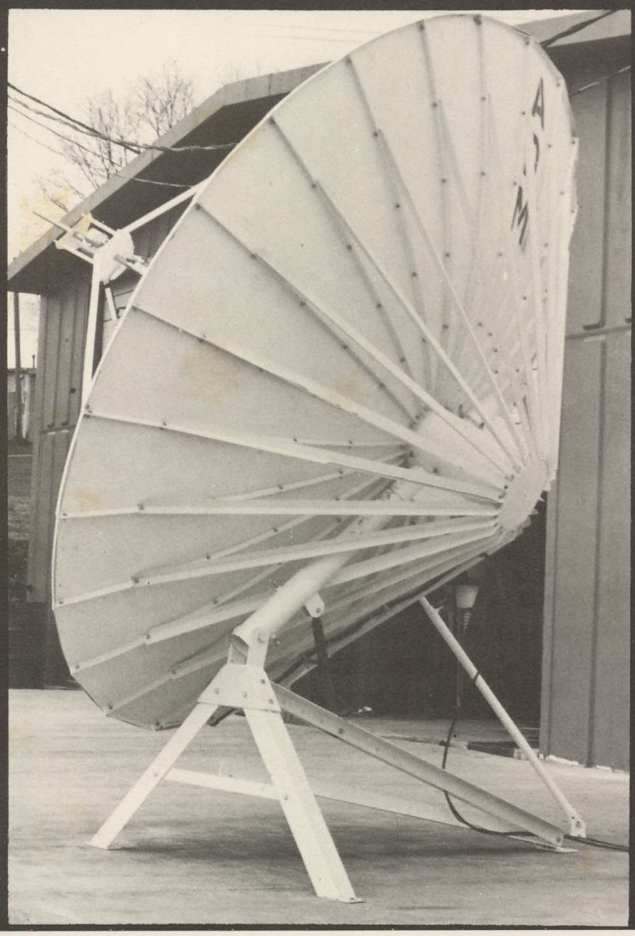
CONTRACT to supply an additional 20 terminals to HI-NET (Holiday Inns) reported by Microdyne; on top of first 87 terminals installed for HI by firm. The newest terminals are to go into franchised Inns; all previous went into company owned establishments.

FCC may have new plan to allow unbridled expansion of MDS terrestrial services (now 2 channels in 2.15 GHz band). Commission is studying plan to allow MDS to move into ITFS band between 2500 an 2690 MHz which in theory could provide up to 28 additional MDS service channels. One observer noted that program sounds like creation of over-the-air cable TV service is behind Commission announcement.

Further details on status of SATCOM FII bird following last September's erratic run-away sequence have been uncovered. Bird experienced partial attitude control loss and intermittent drift while in earth's shadow during semi-annual equinox eclipse period last September 13th. High priority traffic on FII (Alascom and NASA) was immediately moved to FI where four transponders were pre-empted of regular cable TV programming fare. Even with switch to FII Alascom reportedly lost six hours of communications traffic. It took RCA 90 minutes to stabilize FII spacecraft after episode began. Other data relating to FII's present users includes: **Transponder 1** is CBS, ABC, NBC, PBS programming shot to Alaska for taping and later replay on transponder 23 for Bush Terminals. **Transponders 2 and 4** are in use by RCA Americom for voice and data channels. **Transponders 3 and 23** are allocated to Alascom Bush Terminals with video on 23 and audio for 23 video plus other audio and data on 3. **Transponders 5,6,7,10,11,15,19,19,20,21,24** are in use or reserved for use by Alascom (voice and data) communications. **Transponder 8** is reserved for use (under contract) by NBC for feeds primarily between LA/Hollywood and NYC. **Transponder 9** is now in use for AFRTS (Armed Forces Radio Television Service) feeding programs to U.S. bases in such locations as Roosevelt Road, Puerto Rico, Guantanamo Bay (Cuba); much of this **programming** should be off-network U.S. materials selected for enlisted personnel viewing. **Transponder 16** is in use heavily by audio-data channels by such networks as NBC Central, NBC Radio Network, CBS Central, CBS Radio Network Pacific, ABC Radio Mountain and Pacific, National Black Radio Network, Associated Press Radio, Associated Press teletype, United Press International audio news, RKO Radio Network, United Press International teletype, International Media Services, VOA 1,2,3 and 4. Out of operation (i.e. inoperative) are transponders 12,17 and 22. Bird is located at 119 degrees west.

Quick-Satellite-Facts: Audio subcarriers currently in use on SATCOM FI are as follows. Transponder **3** - WFMT (stereo clasical music) is on 5.8 MHz. Transponder **6** - UPI News and Slow Scan is on 6.2 MHz while Easy Listening Music is on 7.4 MHz. Transponder **21** - The Disco Network is on 5.8 MHz while Seeburg Background Music is on 7.4 MHz. **Program control tones** are as follows: Transponder **5** (Movie Channel) turns on east/central receivers with 311 * # and west with 519 * #. Transponder **9** (Madison Square Garden Sports) turns on with 438 * #; Calliope turns on with 168 * #; C-SPAN turns on with 195 * #; and, BET (Black Entertainment Television) turns on with 018 * #. Transponder **10** (Showtime) turns on with 576 * #. Transponder **11** (Nickelodeon) turns on with 749 * #. Tranponder **12** (Showtime) turns on with 576 * #. The Mini-Pay service (Front Row) on transponders 10 and 12 turns on with 481 * #. On transponder **21** SPN utilizes 429 * # while HTN (Home Theater Network, 8-10 PM eastern) utilizes 207 * #. On transponder **22** Modern Satellite Network utilizes 421 * # while HBO (west) utilizes 835 *#. On transponder **23** (HBO's Take-2), they use 529 * # for the eastern two time zones and 681 * # for the western two times zones. Transponder **24** (HBO east) utilizes 835 * #. RCA owned and operated uplinks include Atlanta (not supposed to have video although it has been seen). Vernon Valley (N.J.), Chicago (Lake Geneva), Los Angeles (South Mountain), San Francisco (Point Arena), and Houston. Western Union owned and operated uplinks include Glenwood (N.J.), Chicago (Lake Geneva), Los Angeles, San Francisco, Dallas, Seattle, Phoenix, Atlanta and Honolulu. ATT-GTE uplinks include New York City, Chicago, Tampa, Atlanta, Honolulu, San Francisco and Los Angeles. PBS uplinks include Washington, D.C., Denver, Columbia (S.C.), Lincoln (NB), Hartford (CT) and Talahassee (FL). Independent uplinks include Appalachian Regional Commission (Lexington, KY), C-SPAN (Washington, D.C.), ESPN (Bristol, CT.), Southern Satellite Systems (Atlanta, GA), SIN/Galavision (Los Angeles), CBN (Virginia Beach, VA), PTL (Charlotte, NC), Satellite Systems (Buffalo, NY), KTBN/Trinity (Los Angeles and SIN (San Antonio, TX).





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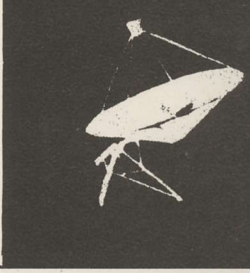

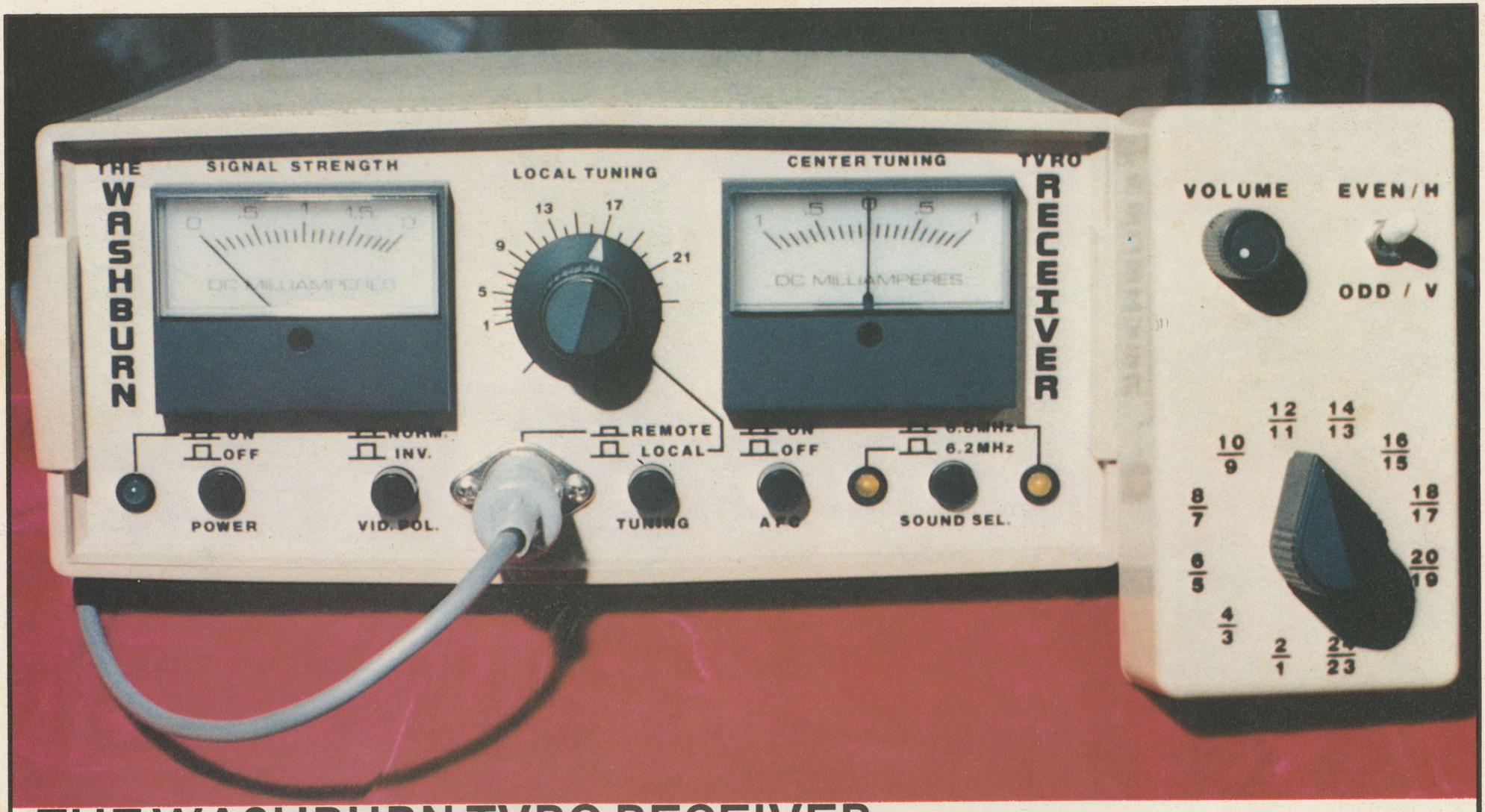

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